Essays on regulation, accounting and market competition

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* This chapter is based on a paper co-authored with Aiyong Zhu and Christopher Koch.

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List of Abbreviation

EBA	Euro Banking Association
EC	European Commision
EU	European Union
FASB	Financial Accounting Standards Board
FRC	Financial Reporting Council
FTSE	Financial Times Stock Exchange
GAAP	Generally Accepted Accounting Principles
GT	Grant Thornton
IAS	International Accounting Standards
IASB	International Accounting Standards Board
IFRS	International Financial Reporting Standard
IO	Industrial Organization
M&A	Mergers and Acquisition
NPV	Net present value
PCAOB	Public Company Accounting Oversight Board
PwC	PricewaterhouseCoopers
R&D	Research and development
ROA	Return to total assets
ROE	Return to equity
SD	Standard deviation

SDC	Securities Data Company
SIC	Standard Industrial Classification
SFAS	Statement of Financial Accounting Standards
UK	United Kingdom
US	United States

Chapter 1

General Introduction

There have been lots of discussions and debates on the usefulness of regulations. And these discussions either focus on the concept of regulation as a whole or some particular regulations (Baldwin and Cave, 1999). It is always challenging to evaluate the effects of certain regulation. And it often depends on the scope and focus of such investigations. If we refer regulation as a general set of rules or standards, then its usefulness is a rather fundamental issue. Or if we focus on one particular set of regulation, its impacts often depend on what setting or what market participants we intend to address. For instance, accounting regulations usually affect accounting professionals who practice these regulation and companies which adopt these regulations.

There are different views for how to define what is regulation. According to the definition summarized by the famous sociologist Philip Selznick, regulation is sustained and focused control exercised by a public agency over activities valued by a community (Selznick, 1948). So following the definition, we could consider market participants or relevant parties related to some markets as a community. When

a public agency for instance government impose regulations on certain market, it is obvious that market participants in such market are the ones suffer the effects and consequences of the regulations. Then it is quite important to consider the scope of market participants or interest parties while investigating the effect of regulations. So if we consider a particular set of financial or accounting regulations, it is reasonable to evaluate market participants in a capital market.

In order to better understand the effect of regulations, it is helpful to understand the common reasons to have regulation in the first place. There are views that believe the power of free market and market forces will operate to best serve the goal of society. So regulation is not really necessary. However, the development of economics regulations is actually a result of market inefficacy (Laffont and Tirole, 1993). We can see that economic regulations are often proposed after some significant market crisis or designed to prevent further crisis (Sarbanes-Oxley Act is a good example). Stiglitz (1998) suggests that market failures in developing countries may be more pronounced, and therefore the case for public regulation is stronger. In addition, information imperfections in market transactions also provide incentives for regulations (Laffont and Tirole, 2000). Accounting regulation, to some extent, can be argued to fulfill such incentives since required accounting disclosure can provide information to mitigate information asymmetry. So regulation should not be considered only in negative terms. It is our goal as researchers to provide more thorough picture of economic reasoning on the effect of regulations.

Regulation and competition

Besides the above mentioned market efficiency-related reason of regulation, preserving competition is considered another important reason. Baldwin and Cave (1999)

point out that the anti-trust regulation exercised by the US at the beginning of twentieth century is a perfect example for regulator's intention to restrain potential or existing monopolies. Monopolies sometime may be associated with price discrimination which could jeopardize the welfare of consumers. When monopolies are in control of a market, regulators often concern the price or quality of products in such market. For instance, the recent developments in audit market reflect that regulations may change when the concerns over lack of competition get serious. One important feature of audit market is that the Big 4 auditors provide services to the bulk of public listed firms in most major economies (Francis et al., 2012). Regulators within EU and the US have discussed various policies that would effectively enhance competition and reduce the high market concentration. So in the eyes of regulators it is necessary to maintain an environment conducive to competition. European commission believes that having a fair competition creates benefits for consumers and enterprises themselves in the form of lower prices and better products. Hence the view of regulators often translates directly into how they would react to certain crisis or change regulations to address certain issues.

Competition in general is an important part of governments' industrial policy. Besides the existing competition I refer in the earlier discussion, entry or foreign competition is another important incentive for regulations. As a part of their industry or competition policies states often evaluate whether to allow for foreign firms to enter certain markets and we can often see examples of regulated market access or forbidden access for foreign firms. For instance, governments are often careful about allowing market access of foreign firms to national security or technology sensitive industry. There are two interesting cases which would well represent how regulators regulate market access in these industries. First, the largest Chinese oil company

attended to acquire Unocal, an American oil and gas operator. But the US congress believed that such transaction would danger the national interest and the potential acquisition was declined (Steger, 2012). Another example is Huawei, the Chinese telecom giant, tried to purchase 3LEAF, an American server technology firm. Because of the concern over national security issues, the US House of Representatives call for a complete ban on acquisitions of American assets by the Chinese telecom companies (Namaki, 2014). These cases show that regulators or governments may act accordingly if there are concerns on entry competition or foreign firms exercising influence in certain industries. And comparing to regulate existing competition, entry competition might create different incentives.

Regulation in different regime

So far the discussion on development of regulations is not restricted to particular countries or particular law origins. I understand the differences embedded in legal systems can significantly affect how regulations develop in different countries. In fact, some research already show that regulations in different countries can take many different forms and the form of regulations can also change over time (Minogue, 2005). In my papers, the research intend to focus on the settings which are less affected by such differences, for instance audit market reform for the EU, or decision process which are common for all firms, for instance product quantity decision in a product market competition setting.

Nevertheless, here I briefly discuss how country difference might be reflected in the development of regulations. According to Majone (1996), historically there have been two main approaches to regulation, the European approach and the American approach. In general, the differences of these two approaches are related to the

earlier mentioned concept “market efficacy”. In Europe public ownership was the main platform of economic regulation. The idea is to let the government to impose regulations on the economy and protect the public interest. And it is also related to the notion that market itself is not able to solve all the problems. However, in the US, independent boards or agencies are responsible for monitoring and enforcing regulations. The idea is that market itself should function well on its own, unless there was a major crisis that government has to step in. This is not to say that government is not playing a role in the process and in many cases government or legislative branch has power over the regulatory agencies, for instance the SEC needs to answer to the US congress. These two approaches are based on different ideologies and different belief on how market works. In Majone’s opinion, for the last five decades, the European have shifted more towards the US approach. Of course, these two approaches cannot include all the differences for all the states. But these two approaches can be somewhat related to the development of regulations, even for developing countries. For instance, China as a developing country with different political regime is more or less using the European approach. In China, the state ownership in all kinds of industries intends or claims to represent the public interests. The development of regulations is often strongly directed by the government and the interest represented by the state ownership. Of course, it is very much debatable whether such practice in China is efficient or not. At least, we can say that these two approaches have their own fair share of failures over the years.

Quality of regulation

It is a complicated issue to evaluate the quality of regulation. As mentioned earlier the effect of regulation can be identified by how market participants are affected.

The quality of regulation in general can be assessed by the effectiveness and efficiency of its outcome (Jillian et al., 2007). Effective regulation should achieve the goals set out by the state or regulatory body. For instance, in the discussion of audit market reform, regulators want to use mandatory rotation or joint audit policy to reduce high concentration. In Chapter 3, we investigate the effect of possible joint audit policy and focus on its counterfactual effects on market structure. Efficient regulation means that the goal should be achieved at minimum costs. The costs can be the cost of administering the regulatory system or the compliance costs of regulation (Guasch and Hahn, 1999). Of course, a full benefit vs. cost analysis is more appropriate to evaluate efficiency. In Chapter 3, change of consumer surplus is considered as a reasonable benchmark for evaluating a particular policy.

Accounting and regulation

The above discussions refer regulation in a more general term. Accounting regulations as main interests of accounting researchers are sharing the similar issues I mentioned before. Accounting practice and accountants (auditors or corporate accountants) as a community are subject to a great deal of regulation. The scope and effects of accounting regulations are of course not limited to the ones practicing accounting. A major objective of accounting is to provide information to interested parties. And accounting data can be viewed as carriers of information, which should affect firms' strategic decision making (Christensen and Demski, 2003). Hence accounting regulations affect a wide range of market participants and firms may report accounting information differently based on certain incentives. The ideal scenario for accounting or accounting regulation is to ensure reliable and relevant reporting and only concern with reporting economics facts (Solomons, 1978). But we all know

that political considerations often affect the process of developing accounting regulations. As Watts and Zimmerman (1978) state that accounting regulation is the result of the interplay of political forces. Accounting professionals have been developing accounting regulation in the spirit of self-regulation since the major regulatory bodies are independent professional bodies. However, governments and firms often use political means to influence the standard setter and the process of developing standard (Dewing and Russell, 2008; Ramanna, 2008; Zeff, 2010). For instance, it is evident that during the financial crisis politicians and financial firms played a role in changing the fair value accounting. The IASB also claim that the change was intended to create level playing field for the European financial institutions to compete with their international competitors.

Accounting regulation and competition

Concerning consequences of accounting regulation, capital market outcomes such as cost of capital or liquidity have been very popular (Daske et al., 2008). With respect to the reporting incentives, capital market also has been the setting that researcher address extensively. However there are certain settings which might be equally important but not studied as extensive as capital market, for instance, competition setting. Competition as an important reason for regulation, and its role in the disclosure literature has been very prominent.[1] In general, competition shapes the information environment and provides important incentives. For instance, firms might have incentives to show worse financial positions with respect to competition policy. In the case of government protecting them from foreign competition, it could be better off for firms to appear as vulnerable. There are empirical evidences

[1] Vivies (2006) provides a summary.

that firms manage earning down in order to seek protection from the state (Jones, 1991). In addition, since accounting numbers are used for anti-trust purpose, firms also have incentive to appear less profitable and avoid receiving further scrutiny (Cahan, 1992; Armentano, 2007). This also is related to the issue that Chapter 2 addresses. In the previous competition-disclosure literature, accounting properties of the disclosure are less reflected, for instance, conservative reporting. And accounting regulators pay more attention to the contracting aspects of disclosure in determining the basic attributes like accounting conservatism, but the effects of information sharing scenario among competitors are less considered (Sadka, 2004). In Chapter 2, I try to address the effect of conservative reporting bias in an oligopoly setting and extend our understanding on the interplay of competition and accounting reporting.

Overview of the chapters

The chapters in this dissertation are more or less related to the issues that either address the impact of regulation or reflect how market participants behave in a regulated market. The scope of these papers is not restricted to accounting regulations but accounting regulations or markets for accounting professionals are mainly embedded in the settings which my dissertation investigate.

In general, this dissertation extends the understanding on the impact of regulation or accounting related regulation on market participants and market as a whole, for instance their market output, competitive strategic disclosure and market structure changes. It consists of four chapters that address diverse research questions but centering on the impact of certain regulation and how would market competition play a role in such dynamic.

In Chapter 2, I investigate the effect of conservative reporting on the output and

profits of competing firms in a product market. Dye (2001) raised the question "are there real effects due to conservative accounting reporting bias, and if so, what are they?" To answer these questions, extensive studies have been done on the role of accounting bias in different economic scenarios such as investment decision and debt contracting. However, little research has been done on its role in a product market setting when facing competing firms. Therefore, I investigate how such accounting bias affects the market output and market structure in an oligopoly setting. The set up allows the research to capture the two different types of competition as mentioned earlier, and they create interesting trade-off for competing firms. Competing firms may want to show their good position in order to make incumbent firms produce less. But they might concern about a possible entrant when entry competition is presence. They may use conservative reporting to deter the possible entrant. Based on prior literature studying the disclosure strategies under imperfect competition, I model a setting which includes both rivalry competition between existing firms and threat of a competitive entrant into the market. The results show that if only existing competition is considered, incumbent firms would prefer more conservative bias in order to obtain higher output. If conditioning on information quality, the optimal level of conservative bias to maximize profits lies in the middle of the defined bias range. So such optimal level of conservatism could be seen as what the existing firms would lobby for. And regulators would also consider conservative accounting for anti-trust purpose. In addition, the results also show that if potential entry is included, the potential entrant prefers less conservative reporting, but the incumbent firms are not necessarily increasing their profits by being more conservative. In sum, these findings suggest a non-monotonic relationship between the conservative bias and competition, and accounting conservatism can be a credible commitment device

in product market competition.

Chapter 3 empirically investigates how a proposed joint audit policy would affect market structure in the UK audit market.[2] With respect to the current discussion for audit market reform, our study provides policy implications for market evolution and social warfare. Bases on the demand estimation approach, we propose a new framework to model the relationship between auditors and client firms in both single auditor regime and joint auditor regime. And we also extend the application of demand estimation model in a unconventional market such as audit service market. In general, we first estimate the demand for single auditors and pairs of auditors using a joint audit market. Then we validate demand estimations for single auditors using a single audit market. Last we use demand estimations for simulating the effects of introducing joint audits in a single audit market. Besides the main three steps, we also have deal with several distinct issues with respect to audit market. In contrast to the standard demand estimation, there are some special features about the product characteristics of audit service that would affect modelling the audit firm choices, for instance, audit fees charged by the same audit firm vary across clients, public listed companies are mandated to hire auditors. Moreover, we only observe audit fees for actual matches between audit firm and clients. Hence we need to predict what audit fees a client would have expected to pay, if it had chosen another audit firm than the one we observed in the data. When predicting audit fees, we also try to deal with the typical endogenous price problem in demand estimation.[3] As suggested by Gerakos and Syverson (2013), the exogenous supply shock from merger and acquisitions between clients are used as an instrument for

[2] The chapter is based on a coauthored paper with Aiyong Zhu and Christopher Koch.

[3] In this case, the audit fees are usually correlated with audit quality or other unmeasured characteristics of audit firms left in the error term.

predicting audit fees. We first test the validity of this instrument in our model and then apply the control function approach to address endogenous predicted audit fees for the nonlinear discrete choice model. In the second stage, we conduct the standard demand estimation by using the predicted audit fees and conditioning on the control function. After identifying clients' preference towards audit firms, we are able to study how the proposed joint audit policy[4] would affect the audit market structure in the UK.

Audit market in the UK is the largest and most concentrated in Europe; whereas French audit market has the lowest concentration ratio and France is the only country that implements joint audit policy in Europe (Ballas and Fafaliou 2008). We are particularly interested in whether the joint audit policy would affect market concentration in the UK. Intuitively, since the high dominance of big four audit firms[5] in the UK it reveals that listed companies prefer the Big 4 auditors because of their high reputation or outstanding service, we should not expect that these companies would choose another small audit firms if they were obligated to hire two audit firms. Then how do we explain the lowest market share of big four audit firms in France? With a deeper dig into the French data, we find that the most prevalent combinations of the two audit firms consists of one from big four audit firm and the other one from a small audit firm. Accordingly, we propose there may exist different synergy (pair effect) in different combinations of audit firms and clients also have heterogeneous preference towards these combinations. Thus, we first use French audit market to identify the synergy (pair) effect between different pair types in joint

[4] Detailed definitions are present in Chapter 3. In brief, joint audit requires that the client has to hire two audit firm issuing one independent audit report annually.

[5] The big four audit firms are referring to PricewaterhouseCoopers, Deloitte, KPMG and Ernst & Young.

audit and in the meantime estimate clients' preference for the individual audit firms. Then we conduct the counterfactual analysis of implementing joint audit policy in the UK. The validation results show that preferences for auditors vary largely by client size, but less so across countries. In another words, the client attributes are mainly driving the choice of auditors, not so much from the institutional differences across countries. The simulation results show that joint audit policy would reshape the market structure substantially and the effects of introducing joint audits are heterogeneous across audit firms. Most importantly, we find that the largest audit firm would even gain additional market share. There would not be so much increase for both medium and small auditors. The counterfactuals also indicate that joint audit would have limited welfare effects. While there are negative effects of forcing clients to partly replace the current auditor with another auditor, the positive pair effect basically reverses this negative effect. As a consequence, the net welfare change for clients in UK would be negative and decrease by 7.2 million GBP for all the clients together on average over the sample period.

Given some of the findings in Chapter 3, in Chapter 4 I seek to extend the understanding on how the merger and acquisitions among client firms affect the dynamic of the relationship between auditors and their clients. Merger and acquisitions between client firms present an interesting scenario for the audit firms. In general, after the merger and acquisition transaction finish, one of the two firms has to drop his auditor. And typically the auditors of target firms are the ones losing their business (Anderson et al., 1993 and Firth, 1999). In this paper, I empirically investigate how client mergers and acquisitions affect the audit fee pricing and the auditors' behavior to issue audit opinion in the UK market. From a price competition perspective, the paper also shows how the other audit firms which are not involved in any M&A

transactions respond to client mergers. In general, audit firms charge less audit fees after more clients merge and acquisition transactions happened. And such fee reducing effect would appear even before the actual merger transaction took place. Given the fact that some of these transactions were rumored or announced relatively long time before the transaction date, it is possible that the auditors anticipate and react to such competition pressure. After experiencing more M&A activities in certain industry, auditors are more likely to issue qualified opinion for the clients in the same industry. Such effects are more pronounced in the post 2008 period, possibly because the introduction of the Eighth Company Law Directive.

In Chapter 5, I look into how particular accounting regulation change affected the practice of bank entities in the time of financial crisis. During that time, the amendments to IAS 39 & IFRS 7 were introduced by IASB as a direct reaction to the financial crisis. Since IFRS followers was given the option to reclassify certain financial assets, it partially changes the mark-to-market requirements, and leads to the fair accounting regime being less tied up with relevant accounting treatments. Using a sample set of manually-collected data, this paper empirically examines how the sampled European banks from different regions use this reclassification to strategically deal with problematic financial assets and how these reclassification activities are associated with different bank characteristics.

The findings show that the new amendment helps the banks in less profitable condition and avoid further impairment losses. In the study, the banks that adopted the reclassification option took advantage of the positive effects on profits. The positive effects on shareholder equity were not as significant. The banks that did not apply the option were characterized by a higher ROE compared to the banks that had applied the reclassification. Among the other financial ratios, leverage

ratio is relevant but not significantly related. Banks from more developed regions were more inclined to apply such change whereas the banks with more investment banking business were not more likely to apply the reclassification option. Lastly, we find that sampled banks from different regions practiced the disclosure requirement differently.

Chapter 2

Conservative Reporting and Product Market Competition

2.1 Introduction

The economic determinants and consequences of accounting conservatism have been studied extensively in a range of different economic scenarios such as investment decision, debt contracting etc. However, its role in a product market setting when facing competing firms is less explored. As suggested by some voluntary disclosure literature with respect to competition (Darrough, 1993; Harris, 1998 etc.), a competing firm may disclose certain information in order to gain competitive advantage. But if the required disclosure is somehow biased by the conservative nature of imposed accounting rules, then it comes into question how the competing firms perceive the accounting bias in the disclosed information. Is the conservative reporting only perceived to be merely a distortion of information in the competition case or does it has real impact on economic agents? With regards to the investment

scenario, Feltham and Ohlson (1996) and Zhang (2002) state that conservative bias has no effect on the inference investors make about the firm's value. It is not trivial that the same claim holds for the competition scenario. So this paper investigates how imposed conservative reporting could influence the structure and outcome of an oligopolistic market and whether the effects remain the same when different type of competition is considered, for instance, competition with potential entrant.

There are some evidences showing that in a competitive market environment, certain required conservative approaches may provide companies with some advantage or at least companies do not raise different opinion about this policy. For instance, in highly competitive industries such as high-tech industry, competition among firms for market share and creation of entry barriers creates large portion of R&D expenditures (Lev and Sougiannis, 1996), however, when the standard was set for more conservative practice i.e., forbidding the capitalization of R&D expenses, firms posed little opposition to such regulation, especially the case of SFAS2 for American firms. So it is interesting to see whether the regulated accounting bias has real effects on firms' output decisions and profits in a product market setting. With respect to the inclusion of potential entry in the setting, Zimmerman (2011)[1] pointed out that financial reporting system characteristics such as transparency or conservatism likely affect entry by potential competitors. Then it is possible that the conservative bias introduced by the reporting system could affect the potential entrant's entry decision and consequently affect the market structure.

In several empirical studies such as Dhaliwal et al. (2008) and Folsom (2010), product market competition is suspected as a possible cause of accounting conservatism. Dhaliwal et al. (2008) document a positive association of this relation.

[1] Lecture slide at 2011 JCAE PhD Consortium

However, Folsom (2010) suggests that this relation might not be monotonous. Hence this paper investigates this relationship further through a competition-disclosure setting. The study contributes to the discussion with some direct theoretical evidences with a model where firms might report conservatively and compete in an product market setting. And the empirical studies for instance Qiang (2003) suggest that the firms with larger market shares might prefer conservative accounting policy because the potential unfavorable regulations such as antitrust actions. As the setting here is the oligopoly model which can be seen as an example of a market with few participants, some implications about how the conservative accounting policy would affect product market structure are derived with respect to the antitrust consideration.

The study is mainly twofold. First the case where only two firms are competing in a duopoly situation is analyzed for the effect of accounting bias on production output and profit. Then the entry decision and triopoly game are considered. The main objective is to observe how the conservatism characteristic affects the disclosed information and the output choice decisions. Since the conservatism feature is imposed by regulation bodies, it is also possible to investigate what the optimal level of conservative bias maximizes the firms' expected profit in this type of situation.[2]

In the existing competition setting the firms prefer itself to report more conservatively and its competitor less conservative in order to obtain higher output outcomes. And when such an accounting system is imposed, they would be benefited by disclosing lower cost signal regardless what true cost realization is, since this can yield higher production output. With regards to the maximization of expected profit under the existing competition, there exists an optimal level of conservative

[2] Although conservatism characteristic is abandoned by IASB, this decision is certainly debatable because the conservative policies are still embedded in the regulations.

bias, however it depends on the informativeness of the accounting report. And the accounting bias introduced by the accounting system in fact lowers the incumbent firms' expected profit compared to the benchmark case where an unbiased system is in place. With the presence of potential entry, a less conservative accounting system is preferred by the potential entrant because it increases the entrant's expected profit, however, no optimal level of conservative bias can be derived. The results in general show that the regulated accounting bias has real impact on the product market structure and such impact at a macro level is more notable in a concentrated market.

The remaining part of the paper is organized as follows. Section 2.2 reviews the relevant literature. Section 2.3 provides the set ups of the model. Section 2.4 presents the results and analysis. Section 2.5 concludes.

2.2 Literature review

As mentioned before, the revealed information that affects competing firms is characterized with the feature of conservative reporting. So this paper is related to prior literature that studies the disclosure strategies under imperfect product market competition. These studies either focus on rivalry competition between existing firms or the threat of a competitive entrant into the market. For instance, Darrough (1993) concludes that in a duopoly setting the incentives to voluntary disclosure is related with the type of private information and firms can communicate relevant "bad news" information to rivals to improve coordination. With respect to entry competition, Gal-Or (1986) states that incumbent firms with unfavorable information tend to disclose such information by considering the incentives from the product market alone.

Darrough and Stoughton (1990) show that the single incumbent firm voluntarily discloses bad news to discourage potential entry. Under a conservative reporting system, it might be more likely for firms to put more weight on unfavorable signals when disclosing information. And under such a reporting system, favorable signals are more reliable as they are produced under stricter scrutiny. When a setting with both rivalry firms and potential entry considered, the accounting bias caused by the conservative reporting might benefit the existing competitor and also may act as deterrence mechanism for the incumbent firms. So this study contributes to the literature on the interaction between disclosures and competition by specifying the shared information with mandated accounting bias while considering both existing competition and potential entry threat.

There have been some studies intended to differentiate the disclosed information through financial reporting manipulation in an imperfect competition setting, for example, accounting fraud (Sadka, 2006) or biased reports (Bagnoli and Watts, 2010). Bagnoli and Watts (2010) demonstrate that firms can influence their competitive position in the product market by introducing bias into the cost disclosure. What differentiates this study is that the shared information is assumed to be subjective to a precommitted accounting system where the aggressive or conservative accounting is characterized. So the reporting bias in this study is set out by the regulation instead of management. And such manipulation could also have effects on the firms' competitive position since conservative reporting policies are commonly embedded with accounting regulations.

In addition, Sadka (2004) points out that from regulator's perspective more considerations were applied to the contracting aspects of disclosure in determining the attributes like the conservatism properties, but the effects of information sharing

among competitors are less considered. This paper sheds some lights on this issue whether the information sharing situation matters in such scenario. The analytical studies of Gigler et al. (2009) and Li (2009) characterize the statistical nature of conservatism in the setting with the debt contracting and conservatism. And this study also extends the conservatism representation used by these studies to a setting where firm competing in product market. And with possible extensions of current model, it is also possible to investigate the effect of accounting bias on production outcomes when the debt contract are involved.

2.3 The set up of the model

2.3.1 Market structure

The setup of the model is rather standard.[3] First it is assumed that the nature of product market competition is Cournot with perfectly substitutable products. First I examine the interaction between two existing firms and also the effect if a potential entrant is considered. When firms competing with an existing competitor, reporting signals showing better prospect might contribute to larger market share, however when facing potential entrant, showing worse signal could have deterrence effects. Especially when an accounting system could bias such signals, this scenario presents an interesting dynamic interaction.

The market demand function for the homogeneous product sold by the firms is

[3] The Cournot set up follows the general setting established in the previous literature like Shapiro (1986), Gal-Or (1986) and Vives (2002). Vives (2006) indicates that the disclosure results might be sensitive to the competition type. However Brander and Lewis (1986) suggests that firms are supposed to compete in quantities. And some comparison studies (Kreps and Scheinkman, 1983) show that after precommit to quantity, firms under Bertrand game yield the same results as Cournot outcomes at least when full information disclosure. So the Cournot competition is used in the current setting.

$P = a - \sum_i q_i$,where $i = 1, 2\, or\, e$ (the entrant), P is the unit price for the product, a is the intercept of market demand $(a > 0)$, q_1, q_2 and q_e represent the quantities produced and sold by each firm $1, 2$ or e. Units of output are normalized so that unit of each product generates the same utility for the consumer. And market demand is common knowledge. It is assumed that marginal costs c_i of the incumbent firms are either low or high. The probability of firm 1 or 2 having low cost or high cost is $\frac{1}{2}$, then the nature decides whether the incumbent firm has low cost or high cost. As here the management's effort to improve the cost efficiency is not considered. And only the firms themselves know their own true cost realization. So $c_i \in \{c_L, c_H\}$ where $i = 1, 2$ and $c_L = c - \varepsilon$, $c_H = c + \varepsilon$, c and ε are known, and $c > \varepsilon$. Accordingly c represents the average production cost in this market and ε is variation value that changes the production cost. The marginal cost c_e for the entrant is distributed over$[e-\omega, e+\omega]$ $(c_e \sim [e-\omega, e+\omega])$. Here I do not make particular assumption about the difference between marginal costs of the entrant and incumbents. However, it is possible that the entrant might have higher marginal cost than the incumbents, since it is new to the market. The marginal cost c_i is a firm's private information and the cost realizations are independent. The profit of each firm is $\Pi_i = q_i \cdot (P - c_i)$ where $i = 1, 2\, or\, e$.

In this setting, it is assumed that the incumbent firms can not communicate their true cost except through the accounting report. The incumbent firms disclose cost information through financial reports prior to the output choices. There have been some studies regarding accounting disclosure apply this premise, for example Bagnoli et al. (2010). The assumption is that a firm's financial statements can be used to infer the firm's reported marginal costs. And information regarding raw material, production technology and labor etc. has been considered to reveal

companies' cost of production. Pae (2000) points out that management discussion and analysis disclosure reveal factor prices (costs). Here the reported information can be masked by certain conservative policy. One also can consider an example that whether firms adopt low or high efficiency production technology, and the costs after the adoption are known. The disclosure regarding the adoption information can be different when more conservative reporting applies. In general the signal can be considered more like an aggregated measurement that indicates the profit prospects of each firm, since cost information is the main indicator that affect the respective profit in this production-decision process and the firm's only strategic decision is on production quantity.

The entry game is set out similar to Hwang et al. (2000) where their study focuses on the welfare consequences of incumbent firms' disclosure effect facing entry. What mainly differentiates this setup is the use of different accounting system representation which will be introduced in the next section. Here the entry part of the game is sequential which allows the entrant to observe the disclosed signal before decide to entry the market.[4] The assumptions about the potential entrant are defined as: the potential entrant does not disclose its cost information and it learns about its cost at the same time as the existing firms. Then the potential competitor will enter the market only if its ex-post expected profit is over a fixed cost K.

[4] There are different types of market entry games, for instance, simultaneous entry (Dixit and Shapiro, 1986), or sequential entry (Vives, 1988).

2.3.2 Accounting system

This section gives the set-up for the accounting system that defines the biased signal. The structure is modeled by adjusting what Venugopalan (2004) and Li (2009) apply. In their settings, high signals mean good condition and low signals mean bad condition. In my setting, as firms disclose cost-related information, the meanings of signals are reversed. So I adjust the conditional probabilities of signals in order to demonstrate conservative reporting. When privately observing its own cost, each incumbent firm discloses a signal of their cost to the public, and the signal can be either a low cost signal s_L^i or a high cost signal s_H^i, where $i = 1, 2$. The report is observable. The signal might be biased by containing a certain degree of accounting distortion. In general, in the accounting system the parameter λ defines the informativeness of the reported signal and δ indicates the degree of conservatism imposed by accounting system, with $\lambda \in [0, 1]$ and $\delta \in [0, 1-\lambda]$. Both λ and δ are determined exogenously by the regulator and the incumbent firms disclose the signals generated by this accounting system. The idea here is to capture the information quality of the disclosure and the imposed accounting bias at the same time.

Since the generated signal is either s_L^i or s_H^i where $i \in \{1, 2\}$, costs are either $c - \varepsilon$ or $c + \varepsilon$, denote L as true cost is low and H as true cost is high, then the following conditional probabilities of signals for different cost types can be defined as:

$$P(s_L^i|L) = \lambda + \delta \qquad P(s_H^i|L) = 1 - \lambda - \delta$$

$$P(s_L^i|H) = \delta \qquad P(s_H^i|H) = 1 - \delta$$

Based on the signal generated, the firm updates its expectation about the cost type of the other firm. Then accounting features can be observed by the respective posterior probabilities of true states which are:[5]

$$P(L|s_L^i) = \frac{\lambda + \delta}{\lambda + 2\delta} \tag{2.1}$$

$$P(H|s_L^i) = \frac{\delta}{\lambda + 2\delta} \tag{2.2}$$

$$P(H|s_H^i) = \frac{1 - \delta}{2 - \lambda - 2\delta} \tag{2.3}$$

$$P(L|s_H^i) = \frac{1 - \lambda - \delta}{2 - \lambda - 2\delta} \tag{2.4}$$

If λ is increasing, the accounting signals are more informative because the probability revealing true state ($P(L|s_L^i)$ or $P(H|s_H^i)$) is increasing. Take $P(H|s_H^i)$ as example, when λ increases, only the denominator of $P(H|s_H^i)$ decreases, so $P(H|s_H^i)$ increases. This means that firms can better infer their competitors' true type when observe the signals. It becomes more informative to differentiate low-cost type from high-cost type. As δ decreases, both $P(L|s_L^i)$ and $P(L|s_H^i)$ are becoming higher, i.e., $\frac{\partial P(L|s_L^i)}{\partial \delta}$and $\frac{\partial P(L|s_L^i)}{\partial \delta}$ are smaller than zero. This means that in a more conservative accounting system firms are less likely to obtain signals that show better profit prospect, in this case low cost signal. Then the accounting system is more conservative. The system is at its most conservative state when $\delta = 0$, high cost type always disclose s_H^i, and is the most liberal when $\delta = 1 - \lambda$, low cost type always disclose s_L^i. Similar to what Gigler et al. (2009) explained in their setting, accounting con-

[5] These posterior probabilities of true cost type are derived from the respective conditional probabilities.

servatism increases the information content of low cost signal which indicates better expectations on future earnings, and decreases the information content of high cost signal which indicates downward expectations on future earnings.[6]

λ defines the information quality of the accounting report and it can be interpreted as how informative the firm require to report or how accurate the accounting numbers are. As it is imposed by the accounting system, the information quality of the signal is the mandated informativeness. The degree of conservative or aggressive bias δ is also defined by this accounting system. The general degree of conservatism is usually enforced by standards and accounting standards define certain conservative approach for instance historical cost accounting for positive NPV project or do not allow the capitalization of R&D costs. When a very conservative approach such as expensing all R&D costs is imposed, δ can be considered with a lower value. And when historical cost accounting is applied, the policy is more conservative and accounting numbers are more reliable. The accounting signals is generated from the two incumbent firms are under the assumption that these firms are committed to the accounting system.[7] So the firm's management discretion through the reporting process is not considered. In this setting, as the firms precommit to the reporting policy, one example can be raised that when the firms try to determine their depreciation policy of production related equipment, they precommit to a conservative or aggressive approach set out by the standard prior to the actual production.

Then the basic time line can be illustrated as:

[6] Then these definitions are consistent with the interpretation of conservatism by empirical studies such as Basu (1997). In his study, the finding on more timely reporting of bad news could be caused by a conservative accounting system with the property that favorable reports have greater information content than unfavorable reports.

[7] This truth telling assumption argues that a strong audit protection is enforced and it makes sure that the firms disclose according to the accounting system.

Figure 2.1: The time-line of the model

2.4 The results and analysis

2.4.1 The competition with unbiased accounting system

In this case, suppose two incumbent firms report their true costs and the signals are perfectly correct. So it is the same as their true costs are common knowledge. Then when there is no entry considered, the equilibrium solutions to the duopoly case are the regular Cournot results with the expected costs (Radner, 1963). When both firms have low or high costs, their optimal production choices q_i are $\frac{a-c+\varepsilon}{3}$ or $\frac{a-c-\varepsilon}{3}$. When one firm has low cost and the other has high cost,[8] the optimal production choices q_i are $\frac{a-c+3\varepsilon}{3}$ and $\frac{a-c-3\varepsilon}{3}$. If the potential entrant decides to enter, then the three firms compete in a triopoly situation. Denote c_e as the entrant's cost and known to the players, then the incumbent firms 1 and 2 will choose their optimal output as $\frac{a+c_e-3(c-\varepsilon)}{4}$ when both have low cost realization and $\frac{a+c_e-3(c+\varepsilon)}{4}$ when both have high cost realization. And when one firm has low cost and the rival has high cost, the output choice would be $\frac{a+c_e-3c+5\varepsilon}{4}$ or $\frac{a+c_e-3c-5\varepsilon}{4}$. Accordingly the entrant's output choice q_e is $\frac{a+c_1+c_2-4c_e}{4}$. And the firm's profit Π_i $(i = 1, 2\, or\, e)$ is simply the square of the output amount. Then denote Π_i^d $(i = 1, 2)$ as the profit in the duopoly situation and Π_i^t as the profit in the triopoly situation, then the profit of firm i under these scenarios are shown in the following table:

[8] The results are symmetric when the cost realizations are reverse scenario.

Table 2.1: The profit of firm i in the benchmark duopoly case and triopoly case

Cost realization	Π_i^d	Π_1^t or Π_2^t	Π_e^t
Both firms have low cost	$\frac{(a-c+\varepsilon)^2}{9}$	$\left[\frac{a+c_e-3(c-\varepsilon)}{4}\right]^2$	$\left[\frac{a+2(c-\varepsilon)-4c_e}{4}\right]^2$
This firm low cost, the competitor high cost	$\frac{(a-c+3\varepsilon)^2}{9}$	$\left[\frac{a+c_e-3c+5\varepsilon}{4}\right]^2$	$\left[\frac{a+2c-4c_e}{4}\right]^2$
This firm high cost,the competitor low cost	$\frac{(a-c-3\varepsilon)^2}{9}$	$\left[\frac{a+c_e-3c-5\varepsilon}{4}\right]^2$	$\left[\frac{a+2c-4c_e}{4}\right]^2$
Both firms have high cost	$\frac{(a-c-\varepsilon)^2}{9}$	$\left[\frac{a+c_e-3(c+\varepsilon)}{4}\right]^2$	$\left[\frac{a+2(c+\varepsilon)-4c_e}{4}\right]^2$

And the firm's expected profit $E(\Pi_i)$ is the weighted average of the four profit values under the situation of duopoly or triopoly.[9] For instance, when truthful reporting is imposed, the expected profit of an existing firm under the duopoly competition is $\frac{a^2-2ac+c^2+5\epsilon}{9}$.

2.4.2 Competition in duopoly situation

Production strategies in duopoly situation

First examine the case when only the two existing firms compete, so the entry doesn't occur or equivalent to the case when no entry game is considered. After the firms observe each other's signal regarding cost and there is no entry from the potential entrant, the information sets for two incumbents can be defined as $y_1 = (c_1, s_1, s_2)$ and $y_2 = (c_2, s_1, s_2)$ where $s_1, s_2 \in \{s_L^i, s_H^i\}$.

Then the maximization problem of each incumbent firm can be described as:

$\underset{q_i}{max} E[P(y_i) \cdot q_i(y_i) - c_i q_i(y_i)]$

For firm i solves

$\underset{q_i}{max} E\left[\left(a - \sum_{j=1}^{2} q_i\right) \cdot q_i - c_i q_i \mid y_i\right]$

[9] If assume that entrant firm randomize his entry decision, then his expected payoff in the this case is the weighted average profit times probability of $\frac{1}{2}$.

Then the first order condition is: $a - E\left(\sum_{j=1}^{2} q_j \mid y_i\right) - q_i - c_i = 0$ for $i \in \{1, 2\}$

In order to find the linear equilibrium, some output strategies can be conjectured. So similar to the linear strategy approach proposed by Radner (1963) and adopted by Hwang et al. (2000), when the firms observe these signals, they can use this set of information structure to update their expectation of the rivals' cost. Firm i anticipates that its rival will use signal s_i to infer its cost c_i and the rival's output choice will condition on the updated expectation. Competing firms use the disclosed information to infer the rivals' true cost. And since they anticipate the rival firms will do so, they will also include the updated cost information in their output strategy in order to avoid disadvantage in the competition. Then the optimal output strategies are:[10]

$$q_1^d(y_1) = \frac{a}{3} - \frac{1}{2}c_1 + \frac{1}{3}E(c_2 \mid s_2) - \frac{1}{6}E(c_1 \mid s_1) \tag{2.5}$$

$$q_2^d(y_2) = \frac{a}{3} - \frac{1}{2}c_2 + \frac{1}{3}E(c_1 \mid s_1) - \frac{1}{6}E(c_2 \mid s_2) \tag{2.6}$$

In the optimal linear equilibrium, the firm's production strategy depends on its own disclosure despite the fact that firm knows its own cost. As suggested by Bagnoli et al. (2010)[11], firm i knows the rival is using i's disclosure to make inference about i's production cost, and then firm i's production strategy depends on its inference about the rival's decision which depends on the information the rival can extract from the disclosure. Since the respective posterior probabilities are known from the earlier definitions on the disclosed signals, the firms will use these posterior

[10] Denote superscript d as the duopoly and t as triopoly. See the caculation for the optimal strategies in the Appendix

[11] page 1196

probabilities to update their believe regarding rivals' cost. Define Ec_L and Ec_H as the expected values of relevant costs based on the observed signals, as the true cost realization is binary, then they are calculated as follows:

$$Ec_L = E\left(c_i \mid s_L^i\right) = (c-\varepsilon)\cdot P(L|s_L^i) + (c+\varepsilon)\cdot P(H|s_L^i) = c - \left(\frac{\lambda}{\lambda+2\delta}\right)\varepsilon \quad (2.7)$$

$$Ec_H = E\left(c_i \mid s_H^i\right) = (c-\varepsilon)\cdot P(L|s_H^i) + (c+\varepsilon)\cdot P(H|s_H^i) = c + \left(\frac{\lambda}{2-\lambda-2\delta}\right)\varepsilon \quad (2.8)$$

As $\frac{\partial Ec_L}{\partial \delta}=\frac{2\lambda}{(\lambda+2\delta)^2}$ and $\frac{\partial Ec_H}{\partial \delta}=\frac{2\lambda}{(2-\lambda-2\delta)^2}$ with $\lambda \in [0,1]$ and $\delta \in [0, 1-\lambda]$, then $\frac{\partial Ec_L}{\partial \delta}$ and $\frac{\partial Ec_H}{\partial \delta}$ are both> 0. If the informativeness parameter λ is held constant, increasing δ leads to both expected costs increase. When the accounting system is less conservative, an increasing δ leads to higher expected costs regardless what signal is sent. So no matter what type of signal the firms send to the market, their rival will expect them more likely to have higher costs because the chances of a high cost firm disclose low cost signal are getting higher. Then since the output outcomes under the existing competition are consist of the market parameter a , the firm's own cost and the expected costs based on the signals. The optimal output strategies are increasing in the market parameter and the expected cost of the competitor, and decreasing in its own cost and expected cost.

Lemma 1. *If the production strategy in the duopoly setting is considered, when λ is held constant, the firm would prefer itself to report more conservatively and its*

competitor less conservative.

According to the relationship of the accounting bias parameter δ and the expected costs based on the observed signals $E(c_1 \mid s_1)$ and $E(c_2 \mid s_2)$, both $E(c_1 \mid s_1)$ and $E(c_2 \mid s_2)$ are decreasing in the degree of conservative bias. And the accounting system is less conservative as δ increases. Here the signal types don't matter anymore, because both $Ec_L$and Ec_H are increasing with δ. So the production strategies are increasing when $E(c_1 \mid s_1)$ is getting smaller (the firm itself is more conservative) and $E(c_2 \mid s_2)$ is getting larger (its rival is less conservative). Intuitively, when one firm reporting more conservative, the competitor will update his believe that the rival has lower cost which means competitive advantage in this case. One could argue that the management discretion on accounting policy is not included in the previous assumptions. However, as proved in Ziv (1993) where two competing firms can send any cost message and is not confined to the truth, the yielded output is the same as the equations (2.5) and (2.6) propose. Then here we discuss the firms' behavior in a relative manner, it is safe to conclude such results and extend to later analysis.

There are four different signal scenarios and two different cost realizations, so in total there are eight possible output choices. If expand all the possible output choices from the equations (2.5) and (2.6) and substitute the value of Ec_L and Ec_H into different scenario of signal combinations, then the following table shows the results of output strategies:

Lemma 2. *When imposed accounting system is in place, competing firms would benefit from disclosing low cost signal to obtain higher output.*

If one of the two firms is considered, the output values under the situation of "LL"

Table 2.2: Output outcomes under the duopoly competition

Signal Type	**True Cost Realization** $(c-\varepsilon)$	**True Cost Realization** $(c+\varepsilon)$
S_L^1, S_L^2**(LL)**	$\frac{a}{3}-\frac{c}{3}+\frac{\varepsilon}{2}-\frac{1}{6}\cdot\frac{\lambda}{\lambda+2\delta}\cdot\varepsilon$	$\frac{a}{3}-\frac{c}{3}-\frac{\varepsilon}{2}-\frac{1}{6}\cdot\frac{\lambda}{\lambda+2\delta}\cdot\varepsilon$
S_L^1, S_H^2**(LH)**	$\frac{a}{3}-\frac{c}{3}+\frac{\varepsilon}{2}+\frac{1}{3}\cdot\frac{\lambda}{2-\lambda-2\delta}\cdot\varepsilon+\frac{1}{6}\cdot\frac{\lambda}{\lambda+2\delta}\cdot\varepsilon$	$\frac{a}{3}-\frac{c}{3}-\frac{\varepsilon}{2}+\frac{1}{3}\cdot\frac{\lambda}{2-\lambda-2\delta}\cdot\varepsilon+\frac{1}{6}\cdot\frac{\lambda}{\lambda+2\delta}\cdot\varepsilon$
S_H^1, S_L^2**(HL)**	$\frac{a}{3}-\frac{c}{3}+\frac{\varepsilon}{2}-\frac{1}{6}\cdot\frac{\lambda}{2-\lambda-2\delta}\cdot\varepsilon-\frac{1}{3}\cdot\frac{\lambda}{\lambda+2\delta}\cdot\varepsilon$	$\frac{a}{3}-\frac{c}{3}-\frac{\varepsilon}{2}-\frac{1}{6}\cdot\frac{\lambda}{2-\lambda-2\delta}\cdot\varepsilon-\frac{1}{3}\cdot\frac{\lambda}{\lambda+2\delta}\cdot\varepsilon$
S_H^1, S_H^2**(HH)**	$\frac{a}{3}-\frac{c}{3}+\frac{\varepsilon}{2}+\frac{1}{6}\cdot\frac{\lambda}{2-\lambda-2\delta}\cdot\varepsilon$	$\frac{a}{3}-\frac{c}{3}-\frac{\varepsilon}{2}+\frac{1}{6}\cdot\frac{\lambda}{2-\lambda-2\delta}\cdot\varepsilon$

(when both firms report low cost signals) are strictly higher than the output values under the situation of "HL" (when firm 1 reports high cost signal and firm 2 remains reporting low cost signal). Similarly, the output values under the situation of "LH" (when this firm reports low cost signal and the other firm reports high cost signal) are also higher than the output values under the situation of "HH" (when both firms report high cost signals). By comparing the output results when firms disclosing either high or low cost signal, the above results show that the duopoly players are better-off when they disclose low cost signal regardless its own real cost realization. So consider existing competition alone, if firms could affect their accounting report, reporting low cost signal would be a dominant strategy.

The expected output for firm i in the duopoly setting which denoted as $E^d(q_i)$ is the weighted output amount from Table 2.2.[12] And $E^d(q_i)=\frac{a-c}{3}$, and the cost parameter becomes the expected cost defined by nature. So the accounting bias introduced by the imposed accounting system has no effect on the expected output outcome for the existing competitors. However the expected profit is affected as the results shown in the following section.

[12] The probability table in the Appendix is used for the weighting.

Expected profit under duopoly

Next derive the representation of firm i's expected profit. So from equation (5), the expected profit $E(\Pi_i)$ is $E\left[\left(a-\sum_{j=1}^{n} q_i\right)\cdot q_i - c_i q_i \mid y_i\right]$. As the derived optimal output strategy $q_i(y_i)$ are the solution to the maximization problem for quantity, from the first order condition we have $q_i(y_i) = E\left(a-\sum_{j=1}^{n} q_i - c_i\right)$. Then the expected profit for firm i in both duopoly and trioploy situation is $[q_i(y_i)]^2$. Then the expected profit under duopoly $E(\Pi_i^d)$ is calculated by sum up the weighted profits under eight different scenarios. And the following proposition can be derived by examining the effect of δ and λ on the expected profit.

Proposition 1. *When the firms precommit to an imposed accounting system, there is an optimal level of conservative bias* $\delta = \frac{1-\lambda}{2}$ *to maximize the expected profit, depending on the informativeness of the signal* $\lambda \sim [\lambda_0, 1]$ where $\lambda_0 \approx 0.58$.

Proof. See the Appendix.

Proposition 1 shows that when the accounting system imposes certain degree of conservative bias and the firms precommit to such reporting policy, there could be an optimal level of conservative bias that maximize the firms' expected profit when facing existing competition, however it is conditional on the informativeness of the reports. This optimal level of conservative bias is at the medium level of conservatism that this system can impose. Such optimal level of conservatism could be considered as what the existing firms would lobby for since it maximizes their expected profits. And this provides the implication that in the empirical setting it is necessary to control for the disclosure quality of the accounting reports. Considering the regulation implications, when regulators are interested in improving the

transparency of an oligopoly market by requiring more disclosure for the anti-trust purposes, the certain level of conservative bias might help to achieve this kind of policy promotion since in fact the existing firms are maximizing their profit. And if the regulators are interested in limiting the profitability of certain oligopoly industry when the quality of disclosure is low, the certain level of conservative reporting policy also helps to minimize the existing competitors' profitability.

Since the accounting system can bias the report from both directions "conservatively" or "aggressively", so the expected profit of the two firms under the extreme cases (when $\delta = 0$ and $\delta = 1 - \lambda$) can be compared with expected profit under the case where an unbiased accounting system is presented.

Proposition 2. *When the existing competitors report under such accounting system, the expected profits are lower than the profits under an unbiased system.*

Proof. See the appendix.

This proposition shows that the accounting bias introduced in such accounting system always decreases the amount of firm profit when existing competitors are considered. And the profits are decreased because of the efficiency loss brought by the accounting bias. Note that from table 2, there are two scenarios that the firm for sure has higher output compared to that under unbiased accounting system: firm with low cost realization disclose low cost signal or high cost signal when the other firm disclose high signal. But the rest of the scenarios are uncertain depending on the level of accounting bias. So under existing competition, the firms prefer unbiased accounting system over the biased accounting system if the objective is to be more profitable. However when profitability often serves as the measure of

monopoly power (Pindyck, 1983; Armentano, 2007), then higher profit might not be preferable. Then if the potential antitrust sanction imposes a cost larger than the expected profit difference [13], this provides some arguments for large firm might prefer conservative accounting policy if the antitrust action is severe. Although it lowers the earnings from the product market, the firms appear less profitable and may avoid the scrutiny of antitrust agency which could impose larger cost.

Proposition 3. *When the firms report under extreme conservative or aggressive accounting system, their expected profits are the same and they are strictly lower than the profit under an unbiased system.*

Proof. See the appendix.

So there are no differences for the existing competitors between a very conservative system and very aggressive system. They would obtain the same expected profits. And these types of biases lower the firms' profits compared to the unbiased accounting system.

Lemma 4. *The firms' expected profits under extreme conservative or aggressive accounting system increases with the level of* λ

To show the relation between the firm's profits under these two cases and the level of λ, the first order derivative of firm i's profits w.r.t. λ both are:

$$\frac{\partial}{\partial \lambda} E(\Pi_i^d) = \frac{11}{18} \frac{\epsilon^2}{(-2+\lambda)^2} > 0$$

So the higher level of λ, the higher the profits under the extreme conservative or

[13] This is possible because the value of $\frac{11}{18} \frac{\epsilon^2\left(2\delta^2+2\lambda\delta-2\delta+\lambda^2-\lambda\right)}{(-2+\lambda+2\delta)(\lambda+2\delta)}$ appears relatively small because the defined range of parameters.

aggressive system. Then how informative the accounting reports matters when the imposed accounting system is either very conservative or very aggressive.

2.4.3 Competition with entry

Production strategies in triopoly situation

When the potential entrant decides to enter the market, since the entrant learns its own cost, its information set would be (c_e, s_1, s_2) . The incumbent firms know that entrant enter the market and assume that they will revise their expectation on the entrant's cost, the expected cost is denoted as $E(c_e \mid s_1, s_2)$. Then the optimal output strategies are:[14]

$$q_1^t(y_1) = \frac{a}{4} - \frac{1}{2}c_1 + \frac{1}{4}E(c_2 \mid s_2) - \frac{1}{4}E(c_1 \mid s_1) + \frac{1}{4}E(c_e \mid s_1, s_2)$$

$$q_2^t(y_2) = \frac{a}{4} - \frac{1}{2}c_2 + \frac{1}{4}E(c_1 \mid s_1) - \frac{1}{4}E(c_2 \mid s_2) + \frac{1}{4}E(c_e \mid s_1, s_2)$$

$$q_e^t(y_e) = \frac{a}{4} - \frac{1}{2}c_e + \frac{1}{4}E(c_1 \mid s_1) + \frac{1}{4}E(c_2 \mid s_2) - \frac{1}{4}E(c_e \mid s_1, s_2)$$

And according to the representation of $q_e^t(y_e)$, the potential entrant would prefer both incumbents less conservative because the values of $E(c_1 \mid s_1)$ and $E(c_2 \mid s_2)$ are increasing when the conservatism parameter δ is increasing (less conservative) when the informativeness level $\lambda$is held constant.

[14] See the Appendix.

The effect of conservative reporting on entry decision

In this section, the entry decision depends on that the potential entrant will enter the market only if its ex-post net profit is bigger than zero. So the profit $\Pi_e^t$is bigger than the fixed entry cost K, or the same as $\left[q_e^t\left(y_e\right)\right]^2 \geqslant K$. Consider the situation when the profit is zero as the boundary condition, and the boundary unit cost for the entrant $\bar{c_e}$ can be derived as:[15]

$$\bar{c_e} = \frac{1}{5}\left[2a + 2E\left(c_1 \mid s_1\right) + 2E\left(c_2 \mid s_2\right) - e + \omega - 8\sqrt{K}\right] \tag{2.9}$$

From (9) it is noted that when the conservatism parameter δ is increasing, the boundary cost $\bar{c_e}$ is also increasing because of the expected costs of two incumbents increase. So if the incumbents are less conservative, the potential entrant would infer that the incumbent firms have higher production cost, then it will be more likely to enter the market since the entrant faces a higher boundary cost and as long as its own cost is lower than this boundary cost, it will enter for sure.

If the different scenarios of the disclosed signals are considered[16], the relation of these boundary cost is: $c_e^{LL} \leq c_e^{HL}(c_e^{LH}) \leq c_e^{HH}$.[17]

The relation is intuitive, when both firms disclose low cost signal, it would be more likely to deter the potential entry. Moreover, when $\lambda = 0$ the signals are not informative at all so the boundary costs are the same regardless what cost signals are sent to the market. Then it is no difference for the potential entrant to evaluate its own unit cost based on the observed signals from the incumbents.

[15] See the Appendix.
[16] Denote superscript LH;HL;LL;HH as the different combination of disclosed signals.
[17] Comparison in the Appendix.

Similarly the probability of entry P_e also can be derived as:[18]

$$P\left(c_e \leq \bar{c_e}\right) = \frac{1}{5\omega}\left[a + 2E\left(c_1 \mid s_1\right) + 2E\left(c_2 \mid s_2\right) - 3e + 3\omega - 4\sqrt{K}\right] \quad (2.10)$$

So this indicates how the incumbents evaluate the entrant's entry probability. When the incumbent firms are reporting more conservatively, the expected values of their costs are lower, then the entry probability of the entrant is decreasing as the entrant infers that the incumbent firms have lower true cost realization.Then considering the probability alone, the incumbent would prefer to report conservatively. Similar to the break-downs of the boundary costs, the relation of the probabilities of entry under different cost signals is: $P_e^{LL} \leq P_e^{HL}(P^{LH}) \leq P_e^{HH}$. When $\lambda = 0$, the probabilities are the same as the signals are not informative.

Lemma 5. *When λ is constant, the potential entrant prefer less conservative reporting for both incumbent firms.*

Because the entrant's expected profit is $\left[q_e^t\left(y_e\right)\right]^2 \cdot P_e - K$ and both $q_e^t\left(y_e\right)$ and P_e are increasing with respect to accounting bias parameter δ. So when the disclosure remains the same level of informativeness, a less conservative reporting system would encourage the potential entrant. This result suggests that when potential competition is considered, a less conservative policy could be better to encourage more market entrants and policy makers might view this as advantage because their aim is often to protect and promote competition in markets.

After obtain the expected cost of the entrant $E(c_e)$ (in the Appendix), all the possible output outcomes for the incumbents in the triopoly game can be expanded from the optimal triopoly production strategies .The following table shows the re-

[18] See the Appendix.

sults:

Table 2.3: Possible production strategies for the incumbent firms under the triopoly game

Signal type	**True cost realization** $(c-\varepsilon)$	**True cost realization** $(c+\varepsilon)$
S_L^1, S_L^2**(LL)**	$\frac{1}{4}\left[a-2\left(c-\varepsilon\right)+E\left(c_e\right)^{LL}\right]$	$\frac{1}{4}\left[a-2\left(c+\varepsilon\right)+E\left(c_e\right)^{LL}\right]$
S_L^1, S_H^2**(LH)**	$\frac{1}{4}\left[a-2\left(c-\varepsilon\right)+E\left(c_e\right)^{LH}-\frac{2\lambda}{(\lambda+2\delta)(\lambda+2\delta-2)}\cdot\varepsilon\right]$	$\frac{1}{4}\left[a-2\left(c+\varepsilon\right)+E\left(c_e\right)^{LH}-\frac{2\lambda}{(\lambda+2\delta)(\lambda+2\delta-2)}\cdot\varepsilon\right]$
S_H^1, S_L^2**(HL)**	$\frac{1}{4}\left[a-2\left(c-\varepsilon\right)+E\left(c_e\right)^{HL}+\frac{2\lambda}{(\lambda+2\delta)(\lambda+2\delta-2)}\cdot\varepsilon\right]$	$\frac{1}{4}\left[a-2\left(c+\varepsilon\right)+E\left(c_e\right)^{HL}+\frac{2\lambda}{(\lambda+2\delta)(\lambda+2\delta-2)}\cdot\varepsilon\right]$
S_H^1, S_H^2**(HH)**	$\frac{1}{4}\left[a-2\left(c-\varepsilon\right)+E\left(c_e\right)^{HH}\right]$	$\frac{1}{4}\left[a-2\left(c+\varepsilon\right)+E\left(c_e\right)^{HH}\right]$

Lemma 6. *When imposed accounting system is in place, firms would benefit from disclosing high cost signal to obtain higher output when entry happens .*

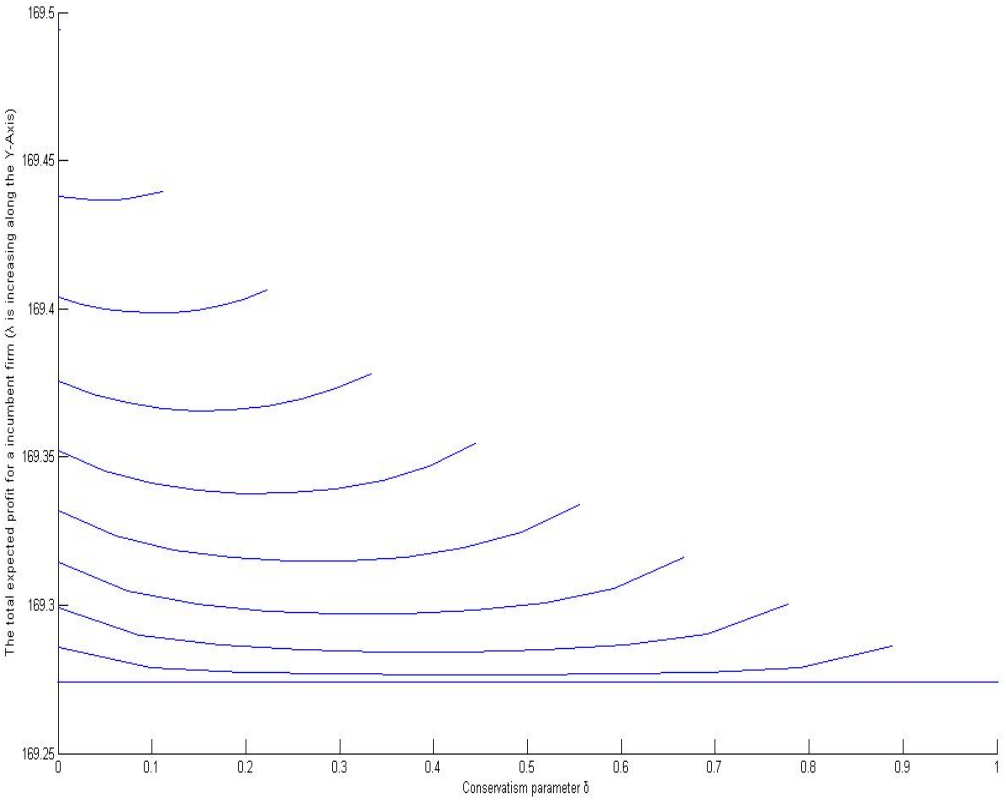
If one of the two firms is considered, the output value under the situation of "HL"(when firm 1 reports high cost signal and firm 2 remains reporting low cost signal) is higher than the output values under the situation of "LL". Similarly, the output values under the situation of "HH" (when both firms report high cost signals) are also higher than the output values under the situation of "LL". By comparing the output results when firms disclosing either high cost or low cost signal, if firms could affect their accounting report,reporting high cost signal is better off for the incumbent firms since from the relation $E\left(c_e\right)^{LL} \leq E\left(c_e\right)^{HL} \leq E\left(c_e\right)^{HH}$, the production choice under "HH" is higher than "LL".

The total expected profit for incumbent firm

As mentioned earlier, the total expected profit for one of the incumbent firm is the weighted average expected profit between both duopoly and triopoly situation. So denote $E(\Pi_i^{Total})$ as this total expected profit: $P_e \cdot E(\Pi_i^d) + (1-P_e) \cdot E(\Pi_i^t)$ which

is weighted on the eight different scenarios. After taking first order condition, it is no feasible solution for an optimal level δ of to maximize the total expected profit for the incumbent firm. However by applying simulation with numeric example, the relation of total expected profit for incumbent firm and the parameters can be illustrated in the following graph (Figure 2):

Figure 2.2: The relation of incumbent's total expected profit and parameters δ,λ



Take numerical values: $a = 50$; $c = 2$; $\varepsilon = 1$;$e = 3$;$\omega = 1$ and $K = 100$

As illustrated in the figure, when the informativeness parameter λ is held constant (one of these ten cases), the total expected profit is not uniformly changing with respect to the conservatism parameter δ and there exists a level of conservative bias that might minimize the expected profit. Since the ten different cases[19] of λ

[19] These cases are randomly chosen and more cases of λ can be taken when graphing this

is distributed increasingly along the Y-axis (the highest case when λ is 1 and it is a point (0,169.48) on the Y-axis; the lowest case when λ is 0 and it is a straight line parallel to X-axis), the expected profit of incumbent firms are increasing with respect to the informativeness parameter. Since the entrant conditions its decision on the disclosed information, the incumbent firms can get better inference regarding the potential entrant's cost information when they disclose their cost more accurately. Then this could contribute to such profit increase as the figure suggests. This observation indicates that the more informative accounting reports or more accurate cost information could result higher profit when both competition scenario are considered. So when regulators impose higher level of informative requirements, the incumbent firms may not be against such proposal. Of course as shown in the graph, such promotion also depends on how conservative the accounting system is.

By taking the exact value of each case, it can be proved that the expected profit is largest when δ equals $1 - \lambda$ in each case. So the incumbent firms may prefer a very aggressive reporting system when λ is held constant and this is not the same as the results from existing competition suggested. And it is intuitive to see that when λ equals 0, the accounting signal not informative at all, the expected profit is the same regardless what the level of conservative bias is. So is the case when λ equals 1, the accounting signal is fully informative (the same as the unbiased reporting). Then this suggests the similar result that the accounting bias lowers the incumbent firm's expected profit in the presence of entry competition.[20]

simulation but it doesn't change the shape or the relation demonstrated by current figure.

[20] The paper is cautious about the generality of this part of results, although the inclusion of more cases in the simulation and change of different combination of numeric inputs don't change the observed results.

2.5 Conclusion

In this paper, a competition model with the disclosed information that contains regulated bias is used to illustrate how the competitive positions of competing firms are affected by the accounting bias imposed by certain accounting system. The results show that if only the existing competition is considered, the incumbent firm would obtain higher output outcome if the rival firm is imposed with a less conservative reporting system. And with respect to the expected profit under duopoly case for each incumbent firm, there exists an optimal level of conservative bias that may maximize the expected profit, but it is subject to the informativeness of the accounting report. This provides testable empirical implication that in the empirical setting, it is critical to control for the information quality of the disclosed report. And the accounting distortion introduced in such accounting system decreases the expected profits of existing competitors. When the potential entry is considered, the potential entrant prefers a less conservative accounting system since the conservative reporting from the incumbent increase the entrant's entry probability and its expected profit. However there is no feasible optimal level of conservative bias in this case. The results from the numeric example suggest that such accounting distortion also lower the expected profit even in the presence of entry competition, but increasing the informative quality of cost information could improve the expected profit level. And when accounting system is not fully informative or not entirely uninformative[21], then the incumbent firms might enjoy a higher expected profit by precommiting to an aggressive accounting policy.

There are some further extensions and improvements to be considered for this

[21] The two boundary choices of λ

paper. First of all, as suggested by Gal-Or (1986) and Vives (2006), the type of information disclosed in the competition could have effects on the optimal level of disclosure. As the focus of this paper is not to derive the optimal disclosure level, this is less concern to the current setting. However it would be interesting to see whether the present results will hold if one assumes the disclosed information as information other than costs, for instance, demands. The similar tests on a Bentrand setting could be also interesting. Secondly, social welfare analysis could also provide more policy implications. Thirdly, only one period of reporting is considered. So firms' competitive position might be different in a multiple period setting. The hidden reserve effect of conservative reporting could change the way how firms update the accounting signal and compete. Lastly, as the current setting only considers the product market, the interaction of conservatism and other influencing factor i.e. debt contracting is not included yet. A further extension could be a setting where firms with debt financing compete in a product market.

2.6 Appendix

The duopoly production strategy

As described, the maximization problem for firm i is

$\underset{q_i}{max} E\left[\left(a - \sum_{j=1}^{2} q_i\right) \cdot q_i - c_i q_i \mid y_i\right]$

Then the first order condition is

$a - E\left(\sum_{j=1}^{2} q_j \mid y_i\right) - q_i - c_i = 0$

So the following equations are conjectured linear output strategies (the approach is similar to what Hwang and Kirby (2000) and Bagnioli and Watts (2010) adopted). M_i and N_i are the coefficients in the linear strategies.

$$q_1^d(y_1) = M_0 + M_1 c_1 + M_2 E(c_2 \mid y_1) + M_3 E(c_1 \mid y_2) \tag{2.11}$$

$$q_2^d(y_2) = N_0 + N_1 c_2 + N_2 E(c_1 \mid y_2) + N_3 E(c_2 \mid y_1) \tag{2.12}$$

Then combine these two strategies and take the expectation based on the information set we have:

$$\begin{aligned} E\left(\sum_{j=1}^{2} q_j \mid y_1\right) &= (M_0 + N_0) + [M_1 E(c_1 \mid y_1) + N_1 E(c_2 \mid y_1)] \\ &\quad + (M_2 + N_3) E(c_2 \mid y_1) + (M_3 + N_2) E(c_1 \mid y_2) \\ &= (M_0 + N_0) + M_1 c_1 + (M_2 + N_3 + N_1) E(c_2 \mid y_1) \\ &\quad + (M_3 + N_2) E(c_1 \mid y_2) \end{aligned} \tag{2.13}$$

$$
\begin{aligned}
E\left(\sum_{j=1}^{2} q_j \mid y_2\right) &= (M_0 + N_0) + \left[M_1 E\left(c_1 \mid y_2\right) + N_1 E\left(c_2 \mid y_2\right)\right] \\
&\quad + \left(M_2 + N_3\right) E\left(c_2 \mid y_1\right) + \left(M_3 + N_2\right) E\left(c_1 \mid y_2\right) \\
&= (M_0 + N_0) + N_1 c_2 + \left(M_1 + M_3 + N_2\right) E\left(c_1 \mid y_2\right) \\
&\quad + \left(M_2 + N_3\right) E\left(c_2 \mid y_1\right) \qquad (2.14)
\end{aligned}
$$

Then substitute the conjectured strategies into the first order condition to obtain the following functions:

$E\left(\sum_{j=1}^{2} q_j \mid y_1\right) = (a - M_0) + (-1 - M_1)\, c_1 + (-M_2 E\left(c_2 \mid y_1\right)) + (-M_3 E\left(c_1 \mid y_2\right))$

$E\left(\sum_{j=1}^{2} q_j \mid y_2\right) = (a - N_0) + (-1 - N_1)\, c_2 + (-N_2 E\left(c_1 \mid y_2\right)) + (-N_3 E\left(c_2 \mid y_1\right))$

So by comparing the coefficients of these two equation groups, the groups of functions can be obtained as:

$M_0 + N_0 = a - M_0$

$M_1 = -1 - M_1$

$M_2 + N_3 + N_1 = -M_2$

$M_3 + N_2 = -M_3$

and

$M_0 + N_0 = a - N_0$

$N_1 = -1 - N_1$

$M_1 + M_3 + N_2 = -N_2$

$M_2 + N_3 = -N_3$

Then solve these equations to give the solution of the coefficients as:

$M_0 = N_0 = \frac{a}{3}$

$M_1 = N_1 = -\frac{1}{2}$

$M_2 = N_2 = \frac{1}{3}$

$M_3 = N_3 = -\frac{1}{6}$

So the optimal output strategies are:

$q_1^d(y_1) = \frac{a}{3} - \frac{1}{2}c_1 + \frac{1}{3}E(c_2 \mid y_1) - \frac{1}{6}E(c_1 \mid y_2)$

$q_2^d(y_2) = \frac{a}{3} - \frac{1}{2}c_2 + \frac{1}{3}E(c_1 \mid y_2) - \frac{1}{6}E(c_2 \mid y_1)$

where $E(c_2 \mid y_1) = E(c_2 \mid s_2)$and $E(c_1 \mid y_2) = E(c_1 \mid s_1)$

The probability table

Table 2.4: The probability table

Signal Type	**True Cost Realization** $(c-\varepsilon)$	**True Cost Realization** $(c+\varepsilon)$
S_L^1, S_L^2**(LL)**	$\frac{1}{2}\cdot(\lambda+\delta)\cdot\left(\frac{\lambda+2\delta}{2}\right)$	$\frac{1}{2}\cdot\delta\cdot\left(\frac{\lambda+2\delta}{2}\right)$
S_L^1, S_H^2**(LH)**	$\frac{1}{2}\cdot(\lambda+\delta)\cdot\left(\frac{2-\lambda-2\delta}{2}\right)$	$\frac{1}{2}\cdot\delta\cdot\left(\frac{2-\lambda-2\delta}{2}\right)$
S_H^1, S_L^2**(HL)**	$\frac{1}{2}\cdot(1-\lambda-\delta)\cdot\left(\frac{\lambda+2\delta}{2}\right)$	$\frac{1}{2}\cdot(1-\delta)\cdot\left(\frac{\lambda+2\delta}{2}\right)$
S_H^1, S_H^2**(HH)**	$\frac{1}{2}\cdot(1-\lambda-\delta)\cdot\left(\frac{2-\lambda-2\delta}{2}\right)$	$\frac{1}{2}\cdot(1-\delta)\cdot\left(\frac{2-\lambda-2\delta}{2}\right)$

Proof of Proposition 1

Proposition 1. *When the firms precommit to an imposed accounting system, there is an optimal level of conservative bias* $\delta=\frac{1-\lambda}{2}$ *to maximize the expected profit, depending on the informativeness of the signal* $\lambda\sim[\lambda_0,1]$ where $\lambda_0\approx 0.58$.

The expected profit of firm i :

$$
\begin{aligned}
&E(\Pi_i^d)=\tfrac{1}{4}\left(\tfrac{1}{3}a-\tfrac{1}{3}c+\tfrac{1}{2}\epsilon-\tfrac{1}{6}\tfrac{\lambda\epsilon}{\lambda+2\delta}\right)^2(\lambda+\delta)(\lambda+2\delta)+\tfrac{1}{4}\delta(\lambda+2\delta)\left(\tfrac{1}{3}a-\tfrac{1}{3}c-\tfrac{1}{2}\epsilon-\tfrac{1}{6}\tfrac{\lambda\epsilon}{\lambda+2\delta}\right)^2\\
&+\tfrac{1}{2}\delta\left(\tfrac{2-\lambda-2\delta}{2}\right)\left(\tfrac{1}{3}a-\tfrac{1}{3}c-\tfrac{1}{2}\epsilon+\tfrac{1}{3}\tfrac{\lambda\epsilon}{2-\lambda-2\delta}+\tfrac{1}{6}\tfrac{\lambda\epsilon}{\lambda+2\delta}\right)^2\\
&+\tfrac{1}{4}(1-\lambda-\delta)(\lambda+2\delta)\left(\tfrac{1}{3}a-\tfrac{1}{3}c+\tfrac{1}{2}\epsilon-\tfrac{1}{6}\tfrac{\lambda\epsilon}{2-\lambda-2\delta}-\tfrac{1}{3}\tfrac{\lambda\epsilon}{\lambda+2\delta}\right)^2\\
&+\tfrac{1}{4}(1-\delta)(\lambda+2\delta)\left(\tfrac{1}{3}a-\tfrac{1}{3}c-\tfrac{1}{2}\epsilon-\tfrac{1}{6}\tfrac{\lambda\epsilon}{2-\lambda-2\delta}-\tfrac{1}{3}\tfrac{\lambda\epsilon}{\lambda+2\delta}\right)^2\\
&+\tfrac{1}{4}(1-\lambda-\delta)(2-\lambda-2\delta)\left(\tfrac{1}{3}a-\tfrac{1}{3}c+\tfrac{1}{2}\epsilon+\tfrac{1}{6}\tfrac{\lambda\epsilon}{2-\lambda-2\delta}\right)^2\\
&+\tfrac{1}{4}(1-\delta)(2-\lambda-2\delta)\left(\tfrac{1}{3}a-\tfrac{1}{3}c-\tfrac{1}{2}\epsilon+\tfrac{1}{6}\tfrac{\lambda\epsilon}{2-\lambda-2\delta}\right)\\
&+\tfrac{1}{4}(\lambda+\delta)(2-\lambda-2\delta)\left(\tfrac{1}{3}a-\tfrac{1}{3}c+\tfrac{1}{2}\epsilon+\tfrac{1}{3}\tfrac{\lambda\epsilon}{2-\lambda-2\delta}+\tfrac{1}{6}\tfrac{\lambda\epsilon}{\lambda+2\delta}\right)^2
\end{aligned}
$$

Then the first order derivative of the above profit w.r.t. the variable δ

$$\frac{\partial}{\partial\delta}E(\Pi_i^d)=\frac{11}{9}\frac{\lambda^2\epsilon^2(\lambda+2\delta-1)}{(-2+\lambda+2\delta)^2(\lambda+2\delta)^2}$$

when $\delta > \frac{1-\lambda}{2}$, $\frac{\partial}{\partial\delta}E(\Pi_i^d) > 0$; when $\delta < \frac{1-\lambda}{2}$, $\frac{\partial}{\partial\delta}E(\Pi_i^d) < 0$

So when $\frac{\partial}{\partial\delta}E(\Pi_i^d) = 0$,obtain $\delta = \frac{1-\lambda}{2}$. Next take the second order derivative w.r.t.δ have

$$\frac{\partial^2}{\partial\delta}E(\Pi_i^d) = \frac{22}{9}\frac{\lambda^2\epsilon^2\left(-6\lambda - 12\delta + 3\lambda^2 + 12\lambda\delta + 12\delta^2 + 4\right)}{\left(2 - \lambda - 2\delta\right)^3\left(\lambda + 2\delta\right)^3}$$

The item $-6\lambda - 12\delta + 3\lambda^2 + 12\lambda\delta + 12\delta^2 + 4$ decides whether $\frac{\partial^2}{\partial\delta}E(\Pi_i^d)$ is >0 or <0. then $-6\lambda - 12\delta + 3\lambda^2 + 12\lambda\delta + 12\delta^2 + 4 = 3\left[\lambda - (1 + 2\delta)\right]^2 + 1 - 24\delta$.

Further substituting $\delta = \frac{1-\lambda}{2}$ into the expression above, it then yields: $12\lambda^2 + 12\lambda - 11$. Setting $12\lambda^2 + 12\lambda - 11 = 0$ then results in $\lambda = \frac{\sqrt{12^2+4\cdot12\cdot11}}{24} \approx 0.58$.

When $\lambda > 0.58$,$\frac{\partial^2}{\partial\delta}E(\Pi_i^d) < 0$ and When $\lambda < 0.58$,$\frac{\partial^2}{\partial\delta}E(\Pi_i^d) > 0$

When $\lambda > 0.58$, $\delta = \frac{1-\lambda}{2}$ maximize $E(\Pi_i^d)$, otherwise when $\lambda < 0.58$, $\delta = \frac{1-\lambda}{2}$ minimize $E(\Pi_i^d)$.

Proof of Proposition 2

Proposition 2. *When the existing competitors report under such accounting system, the expected profits are lower than the profits under an unbiased system.*

Derive $E(\Pi_i^d)$ from the last proof and denote $E^b(\Pi_i^d)$ as the expected profit under the unbiased system from table 1. And the difference between the profit under unbiased system and the profit under current system:

$$E^b(\Pi_i^d) - E(\Pi_i^d) = \frac{11}{18}\frac{\epsilon^2\left(2\delta^2 + 2\lambda\delta - 2\delta + \lambda^2 - \lambda\right)}{\left(-2 + \lambda + 2\delta\right)\left(\lambda + 2\delta\right)}$$

Since

$$-2 + \lambda + 2\delta \leq 0$$

and $2\delta^2 + 2\lambda\delta - 2\delta + \lambda^2 = 2\cdot\left(\delta - \frac{1-\lambda}{2}\right)^2 - (1-\lambda)\cdot\frac{1+\lambda}{2}$

As $\delta \in [0, 1-\lambda]$,when $\delta = 0$,the above expression is $2 \cdot \left(\frac{1-\lambda}{2}\right)^2 - (1-\lambda) \cdot \frac{1+\lambda}{2} = (1-\lambda) \cdot \left(\frac{1-\lambda}{2} - \frac{1+\lambda}{2}\right) < 0$

When $\delta = 1-\lambda$,the expression is the same:

$$(1-\lambda) \cdot \left(\frac{1-\lambda}{2} - \frac{1+\lambda}{2}\right) < 0$$

. When $\delta = \frac{1-\lambda}{2}$, the expression became:

$$-(1-\lambda) \cdot \frac{1+\lambda}{2} < 0$$

Thus

$$2\delta^2 + 2\lambda\delta - 2\delta + \lambda^2 - \lambda \leq 0$$

When $\lambda \in [0, 1]$ and $\delta \in [0, 1-\lambda]$, $E^b(\Pi_i^d) - E(\Pi_i^d) \geq 0$; and they are the same when $\delta = 0$ and $\lambda = 1$

Proof of Proposition 3

Proposition 3. *When the firms report under extreme conservative or aggressive accounting system, their expected profits are the same and they are strictly lower than the profit under an unbiased system.*

When $\delta = 0$,the weighted

$$E(\Pi_i^d) = \frac{1}{18}\frac{-4ac\lambda + 2a^2\lambda + 2c^2\lambda - \lambda\epsilon^2 + 8ac - 4a^2 - 4c^2 - 9\epsilon^2}{-2+\lambda}$$

When $\delta = 1 - \lambda$,the weighted

$$E(\Pi_i^d) = \frac{1}{18}\frac{-4ac\lambda + 2a^2\lambda + 2c^2\lambda - \lambda\epsilon^2 + 8ac - 4a^2 - 4c^2 - 9\epsilon^2}{-2+\lambda}$$

Denote $E^b(\Pi_i^d)$ as the expected profit under the unbiased accounting system, then

$$E^b(\Pi_i^d) = \frac{a^2 - 2ac + c^2 + 5\epsilon}{9}$$

$$E^b(\Pi_i^d) - E(\Pi_i^d) \;=\; \frac{11}{18}\frac{\epsilon^2(1-\lambda)}{2-\lambda} > 0$$

The triopoly production strategies

Similar to what approach apply in the two-firm case and Hwang et al. (2000). Conjecture the following linear output strategies:

$q_1^t(y_1) = X_0 + X_1c_1 + X_2E(c_2 \mid y_1) + X_3E(c_1 \mid y_2) + X_4E(c_e \mid s_1, s_2)$

$q_2^t(y_2) = Y_0 + Y_1c_2 + Y_2E(c_1 \mid y_2) + Y_3E(c_2 \mid y_1) + Y_4E(c_e \mid s_1, s_2)$

$q_e^t(y_e) = Z_0 + Z_1c_e + Z_2E(c_1 \mid y_2) + Z_3E(c_2 \mid y_1) + Z_4E(c_e \mid s_1, s_2)$

Then the optimal output strategies can be illustrated accordingly:

$q_1^t(y_1) = \frac{a}{4} - \frac{1}{2}c_1 + \frac{1}{4}E(c_2 \mid s_2) - \frac{1}{4}E(c_1 \mid s_1) + \frac{1}{4}E(c_e \mid s_1, s_2)$

$q_2^t(y_2) = \frac{a}{4} - \frac{1}{2}c_2 + \frac{1}{4}E(c_1 \mid s_1) - \frac{1}{4}E(c_2 \mid s_2) + \frac{1}{4}E(c_e \mid s_1, s_2)$

$q_e^t(y_e) = \frac{a}{4} - \frac{1}{2}c_e + \frac{1}{4}E(c_1 \mid s_1) + \frac{1}{4}E(c_2 \mid s_2) - \frac{1}{4}E(c_e \mid s_1, s_2)$

The results regarding entry decision

These representation of the relevant terms such as boundary cost, entry probability and expected entrant's cost are similar to what Hwang et al.(2000) derive in their entry setting. But the conservatism parameter δ and the informativeness parameter λ are affecting the boundary cost, entry probability and expected entrant's cost in all signal scenarios that differentiate the results from Hwang et al.(2000).

1. Boundary cost

Assume the boundary unit cost for the entrant is $\bar{c_e}$, then plug the entrant's output strategy into the above condition,obtain the following condition:

$\frac{a}{4} - \frac{1}{2}\bar{c_e} + \frac{1}{4}E\left(c_1 \mid s_1\right) + \frac{1}{4}E\left(c_2 \mid s_2\right) - \frac{1}{4}E\left(c_e \mid s_1, s_2\right) = \sqrt{K}$ (17)

It is assumed that the entrant enters the market when it observes its own unit cost is smaller than the boundary cost $\bar{c_e}$. So

$E\left(c_e \mid s_1, s_2\right) = E\left(c_e \mid c_e \leq \bar{c_e}\right) = \frac{(e-\omega)+\bar{c_e}}{2}$

Then plug the above expectation into (17), the expression of the boundary cost $\bar{c_e}$ is:

$$\bar{c_e} = \frac{1}{5}\left[2a + 2E\left(c_1 \mid s_1\right) + 2E\left(c_2 \mid s_2\right) - e + \omega - 8\sqrt{K}\right]$$

The detailed break-downs of the boundary costs can be shown as follows under different scenarios:

$$c_e^{HL} = c_e^{LH} = \frac{1}{5}\left[2a + 4c - \frac{4\lambda(\lambda+2\delta-1)}{(\lambda+2\delta)(\lambda+2\delta-2)} \cdot \varepsilon - e + \omega - 8\sqrt{K}\right]$$

$$c_e^{LL} = \frac{1}{5}\left[2a + 4c - \frac{4\lambda}{\lambda+2\delta} \cdot \varepsilon - e + \omega - 8\sqrt{K}\right]$$

$c_e^{HH} = \frac{1}{5}\left[2a + 4c - \frac{4\lambda}{\lambda+2\delta-2} \cdot \varepsilon - e + \omega - 8\sqrt{K}\right]$

Then comparing these boundary costs from different situations:$c_e^{HH} - c_e^{HL} = \frac{4\lambda}{(\lambda+2\delta)(2-\lambda-2\delta)} \cdot \varepsilon$,$c_e^{HL} - c_e^{LL} = \frac{4\lambda}{(\lambda+2\delta)(2-\lambda-2\delta)} \cdot \varepsilon$, and $c_e^{HH} - c_e^{LL} = \frac{8\lambda}{(\lambda+2\delta)(2-\lambda-2\delta)} \cdot \varepsilon$. Since $\lambda \in [0,1]$, $\delta \in [0, 1-\lambda]$, and $2-\lambda-2\delta > 0$, the relation of these boundary cost is: $c_e^{LL} \leq c_e^{HL}(c_e^{LH}) \leq c_e^{HH}$

2. Entry probability

Next the probability of entry P_e also can be calculated based on the assumption of the entrant's cost distribution and the boundary cost $\bar{c_e}$:

$P_e = P\left(c_e \leq \bar{c_e}\right) = \frac{\bar{c_e}-(e-\omega)}{2\omega}$

then substituting $\bar{c_e}$ into P_e, obtain

$P\left(c_e \leq \bar{c_e}\right) = \frac{1}{5\omega}\left[a + 2E\left(c_1 \mid s_1\right) + 2E\left(c_2 \mid s_2\right) - 3e + 3\omega - 4\sqrt{K}\right]$

The probabilities of entry under different cost signals are shown below:

$P_e^{HL} = P_e^{LH} = \frac{1}{5\omega}\left[a + 2c - \frac{2\lambda(\lambda+2\delta-1)}{(\lambda+2\delta)(\lambda+2\delta-2)} \cdot \varepsilon - 3e + 3\omega - 4\sqrt{K}\right]$

$P_e^{LL} = \frac{1}{5\omega}\left[a + 2c - \frac{2\lambda}{\lambda+2\delta} \cdot \varepsilon - 3e + 3\omega - 4\sqrt{K}\right]$

$P_e^{HH} = \frac{1}{5\omega}\left[a + 2c - \frac{2\lambda}{\lambda+2\delta-2} \cdot \varepsilon - 3e + 3\omega - 4\sqrt{K}\right]$

Then since $\lambda \in [0,1]$, $\delta \in [0, 1-\lambda]$, and $2-\lambda-2\delta > 0$, $P_e^{LL} \leq P_e^{HL}(P^{LH}) \leq P_e^{HH}$

3. Expected entrant's cost

As the expectations of the entrant's cost is considered as the mean of $e-\omega$ and the boundary cost $\bar{c_e}$, given the disclosed signals and the derived expression of $\bar{c_e}$, the value of $E\left(c_e \mid s_1, s_2\right)$ should be:

$E\left(c_e\right) = \frac{1}{5}\left[a + E\left(c_1 \mid s_1\right) + E\left(c_2 \mid s_2\right) + 2e - 2\omega - 4\sqrt{K}\right]$

Then the different expected costs are:

$E\left(c_e\right)^{HL} = E\left(c_e\right)^{LH} = \frac{1}{5}\left[a + 2c - \frac{2\lambda(\lambda+2\delta-1)}{(\lambda+2\delta)(\lambda+2\delta-2)} \cdot \varepsilon + 2e - 2\omega - 4\sqrt{K}\right]$

$E\left(c_e\right)^{LL} = \frac{1}{5}\left[a + 2c - \frac{2\lambda}{\lambda+2\delta} \cdot \varepsilon + 2e - 2\omega - 4\sqrt{K}\right]$

$E\left(c_e\right)^{HH} = \frac{1}{5}\left[a + 2c - \frac{2\lambda}{\lambda+2\delta-2} \cdot \varepsilon + 2e - 2\omega - 4\sqrt{K}\right]$

Since $\lambda \in [0,1]$, $\delta \in [0, 1-\lambda]$, and $2-\lambda-2\delta > 0$, similar to the entry probabilities, the relation of these expected costs is $E\left(c_e\right)^{LL} \leq E\left(c_e\right)^{HL} \leq E\left(c_e\right)^{HH}$

Chapter 3

Joint Audit and Audit Market Competition*

3.1 Introduction

Audit market concentration has been a serious concern for the regulators and many market participants. It is a well established fact that the Big Four auditors (Ernst & Young, KPMG, PricewaterhouseCoopers and Deloitte) provide services to the bulk of public listed firms in most major economies (Francis et al., 2012; Sikka 2013). For instance, in the UK market, 90% of FTSE 350 index firms are audited by the Big Four and in the US they collect more than 90% of total audit fees.[1] Moreover, even for the small cap companies, it seems that the Big Four are gaining their business for several years now (Morningstar Professional Services Rankings Guide, 2012). As indicated by the Morningstar research report, Deloitte and Ernst & Young are the top two earners for this section of the market in terms of total profit. The regulators

* This chapter is based on a paper co-authored with Aiyong Zhu and Christopher Koch.

[1] FTSE 350 is a share index of the 350 companies listed on the London Stock Exchange with the highest market capitalization.

concern that the high concentration has created high entry barriers for the audit service market and companies purely favor the Big Four because of their dominance (Government Accountability Office, 2008; European Commission, 2010). They also concern that the lack of choice in the audit market, especially for financial service industry, might have serious ramifications if one of the Big Four fail like Arthur Andersen did.[2] After the financial crisis, these Big Four audit firms came under scrutiny since they were accused of being "too cosy" with their clients and the regulators especially the auditing policeman of UK, Financial Reporting Council (FRC), believe auditors should take a "stronger lead" in checking certain industries such as banking or mining (Jones, 2013). Hence both the US and the EU regulators are discussing possible regulatory changes. When the Public Company Accounting Oversight Board (PCAOB) in the US is still exploring the possibility of introducing audit reforms, the European parliament is acting more swiftly. Several proposals have been made by Michel Barnier (the EU internal market commissioner) and the parliament members are currently drafting the proposed law. These efforts made by regulators suggest that they are rather determined to improve competitiveness of the audit market.

Among some major reform proposals put forward by the EU regulators, joint audit policy has been more controversial in the policy debate (Jones, 2013). Since the European Commission green paper (2010) expresses the concern over audit market concentration, the mandatory joint audit was first seriously considered by the European Commission (henceforth EC) in 2010, then in the early 2011 proposal, the joint audit policy become only "encouraged" due to the concern for seeking

[2] This might be possible since some of the Big Four have been investigated by US regulators for criminal wrongdoings either in the US or abroad (Rapoport, 2014)

enough support in the EU states (EC, 2011a, article 31, para. 1). However, later the European Union lawmakers beef up the reform by adding the joint audit to a draft EU law designed to improve the performance of audit firms (Jones, 2012). The most recent development indicates that the lawmakers again drop the initial proposal when facing unpopular support from corporate clients and the Big Four (Barker and Jones, 2011; CFO UK, 2012; Jones, 2013). In general, the corporate clients believe joint audit would raise their audit costs and the Big Four claim that it would be also not effective to work with another audit firm. Apparently the EU regulators have gone back and forth on this particular policy debate. This implies that joint audit is quite controversial since this proposed reform is obviously welcomed by the mid-tier firms and the Big Four quickly lobby against such policy (UK parliament report, 2011; Jones, 2012). And the existing evidences are not conclusive enough to support regulators to push the reform forward.

Hence our paper intends to provide a thorough investigation on how joint audit policy would affect the audit market. In particular, we focus on the public quoted firms in the UK. The main reason we look into the UK audit market is because of its importance in the European setting. During the debate process of possible audit market reform, the EU lawmaker was waiting for the outcome of UK inquiry into competition in the audit market. And many believe that the pending views from the Competition Commission would significantly affect the reform of the audit market in the EU (Crump, 2012). Moreover, the current draft law on audit market reform is sponsored by one British conservative member in the European parliament. In his own words, "The views presented by the Competition Commission will be one of a number of factors considered when designing the future of the audit market in the EU," said Sajjad Karim, the British lawmaker who is leading the reform. The recent

approval of EU audit reform framework indicates that the views of the Competition Commission and the FRC have been significantly considered (Deloitte, 2014). So we think that the UK market would be a good sample market for the estimation of possible EU audit market reform.

Joint audit policy was adopted or is still in use for a few EU states.[3] Denmark had mandatory joint audit until 2005, then the requirement was abolished. In fact, France is the only EU country that currently implements this policy for the listed companies. France and Denmark are reported to have the least concentrated audit markets in Europe (London Economics, 2006). So it is the EC's intention to use such policy to shape up the audit market competition and allow the medium or small size audit firms to participate in large audits (EC 2010). As mentioned above, such policy is not welcomed by all parties. The advocates of joint audit argue that the potential benefits could include: less concentrated market, the audited evidences are better assured by two professional firms, and the audited report has to be co-signed by both firms, then it is less likely for both firms to collude with the client. However joint audits may suffer from a potential free rider problem (Deng et al., 2012) and it is possible that there could be chance of miscommunication between two firms.[4] The potential rising audit fee is the other argument brought against the joint audit.

What actual effects this policy reform might bring is still unclear. The up to date empirical research provides mixed evidences on the impact of joint audit on audit fees and audit quality (Francis et al., 2009; Andre et al., 2012; Ratzinger et al., 2013). They find limited support to suggest that joint audits lead to increased audit quality, but some support to suggest that joint audits lead to additional costs.

[3] For example, Sweden allows voluntary joint audits.

[4]There are concern raised by audit committee chairs in the UK (Jones, 2012).

However, these studies mainly focus on the correlations between audit fees (or audit quality) and firm characteristics.

Our research goes beyond and addresses these issues with a demand and supply market framework. We model client firms' preference for audit service based on the clients' own attributes as well as the auditors' attributes. So our estimation quantifies clients' heterogeneous preferences over each individual audit firm. Moreover, since most of the existing empirical researches are conducted on the French or Danish cases, these current evidences could not answer the question "how would the joint audit shape up an audit market like UK which does not have this policy". Thus our research intends to contribute to such question and additionally address it especially from a social welfare perspective.

Our empirical analysis on the effects of joint audits evolves in three steps. In a first step, we describe and examine the demand fundamentals for a joint audit market and a single audit market. We assume that the audit market is characterized by differentiated audit services. For example, our assumption holds when an industry specialists offers an audit service that is of different quality than the audit service offered by a non-specialists. We assume that client firms pick the auditor that maximizes their own utility. In the utility maximization framework, clients consider the attributes of audit firms, e.g., industry specialization. They also consider how well the audit firms match with their own attributes, e.g., client size. The price of the audit services enters into negatively into the utility equation. Based on this framework, we can identify the demand fundamentals by using data on publicly listed firms in France and in the UK. We observe that the client preference towards certain auditors are mainly driven by the client attributes. Furthermore, when using our estimates for client preferences to predict audit choice, we observe that our

predictions are quite close to the actual choices with a rate of successful predictions of more than 82%.

In the second step, we consider in the demand estimation that client firms do not only pick individual auditors but pairs of auditors. Previous research suggests that client firms prefer specific pairs of auditors (Francis et al., 2009). A client that has a Big Four auditor in a single audit regime might improve the cost-effectiveness of the audit in a joint audit regime by adding a medium-sized or small audit firm as a second auditor. It appears likely that different combinations of auditor pairs differ in their abilities to cooperate, implying different levels of coordination costs and synergies benefits. For example, the Big Four audit firm may achieve a more cost-effective collaboration as they share a similar audit methodology. Our empirical approach allows us to estimate the pair effect using French data. The pair effect captures the opportunity of client firms to pick the combination of two auditors that is most suitable for them. We do so by incorporating all possible pair combinations into the clients' utility to choose auditors. We consider that the preferences for pair combinations may differ across clients with different characteristics by interacting the pair combinations with client attributes.

The third step involves the analysis of the effects on market structure and social welfare when joint audits are introduced in a single audit regime. We assume that UK firms will most likely handle an introduction of joint audits by choosing a second auditor while keeping the current one. This scenario seems likely given the persistence of auditor-client relationship. [5] In the analysis, we derive counterfactuals for choices of auditors and auditor pairs in the UK. We do not change the preferences

[5] Based on the report of UK parliament in 2011, a FTSE 100 auditor remains the same auditor for about 48 years on average; for the FTSE 250 the average is 36 years.

of UK firms for individual auditors, but we include preferences for combinations of auditors based on the estimated pair effect from France. Our estimates for pair effects can be transferred to other contexts assuming that the pair effect is mainly driven by client characteristics. This approach enables us to investigate the policy implications of joint audit quantitatively. Moreover, we can also assess changes in consumer surplus for estimating welfare implications. We define consumer surplus for the audit market as the difference between the total value that clients derive from the audit services and audit fees.

The simulation results suggest that the big four auditors would benefit very differently in terms of their market share. The market leader PwC in the UK would experience a significant increase in the market share not only measured by the number of clients, but also would have a fairly increase around 6.5% in the market share measured by clients' assets. The second largest auditor Deloitte would have slight decrease in the market share on the number of clients; but a slight increase in the share measured by clients' assets. The other two big four auditors would have significant percentage decrease in their market shares in terms of both the number of clients and clients' assets. With respect to the medium auditors (in this case Grant Thornton and BDO), the change in their market share shows a different pattern. Both auditors would have a sharp drop, more than 40% in their market share measured by the number of clients; however, their share in the client assets would change in a completely contrasting way. BDO would stay more or less the same, but Grant Thornton would quintuple the original share. The means that although medium auditors lose some clients, they would be able to compete for the big clients under the counterfactual joint audit policy.

Given the simulation results, it seems no surprise that Grant Thornton and BDO

are the main voice to support such reform in the audit market since the medium auditors would gain some market share. However, it is surprising that the Big Four would necessarily lose their clients because of joint audit and some of the Big Four would even gain market share, for instance PwC as the market leader would benefit from such policy. The small auditors would not benefit too much compared with the medium auditors. The total market share audited by all small auditors in terms of both the number of clients and client assets would increase very marginally, around 2%. Additionally, we can also compare the counterfactual results with the predicted market shares which are derived from the model fitness tests. All the changes for different auditors are moving the same directions as we compare the counterfactuals with the actual market shares. So our assumption about clients from different markets choose similar type of auditor when their client attributes are similar doesn't bias our results, at least the counterfactual changes remain quite similar.

Our counterfactuals also show that if such policy were introduced in the UK, the total consumer surplus would decrease by 7.2 million GBP on average over time. Consumer surplus in the audit market is defined as the difference between the total value client firms place on the audit service provided by the auditors and the audit fees client firms pay for. The decomposition of the change in consumer surplus shows that the consumer surplus difference between one single auditor and two single auditors would decrease by 220 million GBP; while the pair effect associated with joint audit would increase the consumer surplus by 212.8 million. It is not surprising that the consumer surplus would decrease if clients were forced to choose another auditor, generally the second-best in the market, but the pair effect would compensate this loss even though not high enough.

The remainder of the chapter is organized as follows. First, section 3.2 relate this chapter to the existing literature. Next, section 3.3 present the details of the structural model to be estimated and discuss some specific issues related to the audit market. Then section 3.4 describe the dataset used for empirical analysis. Finally, the estimation results and counterfactual analyses are discussed in section 3.5 and then followed by the conclusion.

3.2 Literature Review

Our paper relates to studies that describe audit market competition and draw implication on pricing or differences on audit quality from the analysis (Simunic, 1980; Francis et al., 2005; Hay et al., 2006). This strand of literature has shown that clients value audits differently and are willing to pay different fees for audits performed by different types of auditors (Numan and Wilekens, 2012). We follow these literature on what they found as significant auditor attributes,for instance,industry specialist and we also use the client attributes that previous studies describe as important in the audit pricing (Hay et al., 2006). But our estimation approach offers a broader theme of possible evaluations on the client and auditor relationship. The issues related to demand, supply and strategic responses of market participants are all able to be included under such framework. This allows us to provide more thorough evidences on possible policy effects than the previous papers. The existing studies also show that the Big Four or industry specialist may earn a fee premium. Such evidences on the fee premiums are more prominent for US studies (Numan and Wilekens, 2012). In our setting, the typical auditor attributes includes the industry expertise proxies similar to what these studies define and the dummy variables in-

dicate individual type of auditors (ex. the Big Fours or the medium auditors).The preferences over certain auditors from certain clients are estimated to describe the auditor-client relationship.

As our model describes how listed firms choose auditors, our research is related to the studies on auditor choice. Prior research argues the selection of an auditor could be due to either cost or quality considerations, or both (Knechel et al., 2008). Cost is often associated with audit fees and the quality perspective is often manifested as the Big Four or certain groups of auditors provide better quality. Of course the evidences are rather mixed regarding different types of clients (Francis, 2004). The general consensus is that the characteristics of client firms are affecting their choice of auditors. And what we usually observe from previous studies is that the client attributes associated with audit fees often affect the auditor choice (Craswell et al., 1995; Hope et al., 2012). Our demand estimation approach basically considers the match between certain clients with certain auditors reflects the choice preference of certain clients and the estimation approach quantifies such choice preference. Generally, the existing studies on auditor choice have been more focus on the choices between the Big Four and the non-Big Four. But we intend to address the choice preference with more specified choices, so our research has more detailed choice sets and the choice set contains each individual big four auditor, each individual mid-tier firms and other small small auditors (outside options). The specifications allow us to investigate changes in the market structure for more relevant individual audit firms if certain policy were introduced.

Our study models the audit service market if an individual client would choose a better fitting auditor. The matching is conditioned on both the client's attributes and auditor's attributes. So the framework of audit market competition no only

captures the cost consideration of client firms but also the quality perspective. It would be ideal to have data on more directly observable auditor attributes. But since we conceptualize the auditor client relationship as the clients consider how the attributes of auditors would fit its needs and choose the auditor offers the best net value. The more direct auditor attributes, such as numbers of staff or hourly rate of audit work, would already be captured by the observable attributes such as audit fees or industry expertise. And since our model describes the market more from the client firms' point of view, it is adequate to measure the demand fundamentals based on publicly observable attributes.

The demand estimation we use in this paper is well developed in the industrial organization literature (Berry et al., 1995; Berry et al., 2004). But there is very little empirical research on the service related market. There are some unique features about service markets, like the audit market. For instance since the listed firms are obligated to have their financial reports audited, there is a minimum amount of service required. In a typical differentiated product, the price for the same product does not vary across clients. But for the audit market the price (audit fees) differs across clients and only available for those actual chosen auditors in the data. Hence by addressing these issues in the demand estimation, our paper also contributes to the IO research which investigates demand fundamentals in the general service market. Gerakos and Syverson (2013) is one contemporaneous study that applies a similar approach to investigate possible market impact when one of the Big Four fails or mandatory rotation were introduced in the US. But we focus on different policy issues and address the endogenous issue of audit fees in a more careful way with respect to the demand estimation.

3.3 Demand Model

To model how clients choose audit firms, we apply the random utility maximization approach, rooted in McFadden's choice theory (McFadden, 1973).In order to accommodate the auditor choice for clients from both France and the UK in a common framework, We assume mainly the client's attributes and auditor's attributes addressed in our demand model drive the clients' auditor choices. With respect to the two markets we are looking into, UK and France, the differences between these two markets are in fact not affecting the firms' auditor choices much, especially regarding the choice of having the second auditor. Then we specify the assumption that the underlying heterogenous preference for auditors are the same across markets for clients in both markets conditional on their characteristics.

For this particular assumption, We mainly assume the client's attributes and auditor's attributes addressed in our demand model drive the clients' auditor choices. With respect to the two markets we are looking into, UK and France, the differences between these two markets are in fact not affecting the firms' auditor choices much, especially regarding the choice of having the second auditor. During the time period of our data, the listed firms in both countries have mostly adopted IFRS so that they are subject to similar set of accounting standards.[6] And as listed firms, these clients would also share similar market incentives for considering the auditor choice. Moreover, the industry compositions of these two markets share a lot of similarities (see Table (3.9) in the appendix). We understand that these two markets are somewhat different and there are different audit policy implementation. But we provide empirical evidence to validate this assumption and show that indeed the preferences

[6] In both samples more than 90% firms have adopted IFRS. We also run robustness checks with an IFRS dummy and it doesn't change our results.

over single auditor choices are quite similar across these two markets. So it is reasonable to derive the counterfactuals for the UK firms by taking the preferences from the French market. This assumption does not seem as strong as it appears but we provide empirical validation that it does hold empirically.

We model the demand of listed firms for audit services as these clients choose a better fitting auditor among several potential auditors, in our case, each individual Big Four auditor, two medium auditors that rank as the fifth and the sixth in each market and the other auditors as outside option. The client firms also choose the better fitting auditor in order to maximize the expected benefits obtained from using such auditor. The expected benefits are captured by the preferences attached to client attributes, auditor attributes and match-specific attributes. And the match-specific attributes are the audit fees and tenure. For instance, to illustrate a simple example, assume in the estimation there is a positive parameter shown for client size, then we can claim that larger client would enjoy higher utility from having an auditor. However, such effect would be the same for all potential auditors. So such parameter wouldn't really help us to identify the choice preference. But if we interact client size with different auditor dummies, then the interaction terms can inform the auditor preferences of clients with different sizes.

We also assume the utilities enjoyed by clients for individual auditor attributes are addable. In another words, we assume the clients' utilities reflected in different attributes are addable. Of course, the audit service is a product different from typical merchandise, but since the service is difficult to separate into units and the directly measurable variable such as working hours is difficult to observe for researchers. As mentioned before, we utilize the observable attributes to capture clients' choice preference and some of the unobservable characteristics are already

represented. This type of demand models are commonly used in the IO literature and some marketing research (Dube et al., 2002 and Train, 2009), especially for differentiated products. In the model, each firm chooses its auditor based on the expected utilities from having each of the auditors. In the later estimation, as small auditors are considered outside option and normalized, the utilities for having the Big Four auditors and the medium auditors are benchmarked by the outside option. So the client firm's preference represents the relative level of client utility for audit service. The model essentially describes the clients' willingness to substitute different auditors based on its own attributes.

3.3.1 Choice of single audit

The publicly listed firms (clients) are mandated to hire an auditor each period (year) to maximize their utility. The audit firms in the choice set for every client includes the Big Four (Ernst & Young, Deloitte, KPMG and PwC), two medium audit firms (BDO and Grant Thornton) and all other audit firms grouped as small auditors. The deterministic part of the utility of client i at period t choosing one of the top 6 (the Big Four plus 2 medium auditors) audit firms $j = 1, \ldots, 6$ in both France and the UK is given by:

$$V_{ijt} = \alpha_0 X_{ijt} + \alpha_1 \chi_{ijt} + \sum_{k=1}^{6} (\beta_{1k}\delta_k + \beta_{2k}\delta_k \tau_{it}) - \alpha_2 p_{ijt} + \xi_{jt} \tag{3.1}$$

The deterministic component V_{ijt} of utility is approximated as a function of observed auditors' attributes as well as clients' characteristics. Variable X_{ijt} denotes audit firm j's attributes: industry expertise or industry specialist, defined in the same

industry as client i.[7] This is to capture the fact that clients in certain industries may have systematically different preference for specific auditors. Variable χ_{ijt} denotes the tenure between client i audit firm j in period t. p_{ijt} is the audit fee that client i pays to auditor j in period t, which will be discussed in length in the next subsection. Parameter α_2 captures the marginal willingness to pay a unit of audit fees; ξ_{jt} denotes unobserved (to researchers) auditor j's attributes, e.g., reputation and quality.[8]

Variable δ_k is the dummy variable for the top 6 audit firms; parameter β_{1k} captures the auditor fixed effect that represents the mean utility for all clients choosing auditor k. It is well known that clients with different size prefer different audit firms: big clients may prefer the Big Four while small clients may prefer the non-Big Four.[9] Hence, we use the interaction between clients' size measured by logarithm of total assets with auditor fixed effect to capture this heterogeneous preference. In principle, we could interact all clients' characteristics with auditors' attributes to allow for a very flexible form of heterogeneous preference, but this requires more variation from the data to identify all the parameters. At this stage, we just use the general notation τ_{it} for clients' attributes and we will specify the exact interaction term in the estimation stage.[10] If client i chooses outside option, i.e, a small auditor (non-top 6 audit firms), we represent the utility as V_{i0t} and normalize it to be zero:

$$V_{i0t} = 0$$

[7] Industry classification is based on Famma-French criterion.

[8] "unobserved" term refers some auditors' attributes difficult to measure or observe in the data from researchers' perspective. From clients' perspective, in the model they can observe every attribute when making the decision to choose the auditor.

[9] The Big Four audit almost all the FTSE 100 companies, and 240 of the companies in the FTSE 250 (the House of Lords Economic Affairs Committee, 2011).

[10] Please find the complete description of variables in the Appendix

It is a standard approach to normalize the deterministic component of utility of choosing outside option as 0 because utility is invariant to monotone transformations. Since the identification requirement of discrete choice model (the demand estimation approach) imply that only the difference of utilities matters (Train, 2009), we normalize the utility of choosing small auditors to be a constant number, typically as zero. So we consider all the small auditors provide homogenous audit service. The client utilities of choosing different small auditors are the same.

3.3.2 Choice of joint audit

As joint audit is mandatory in the French audit market,[11] clients are obligated to choose a pair, i.e, two different auditors at the same time. Similar to the UK market, the set of single audit firms in France also consists of the top 6 auditors and the small auditors. Therefore, the choice set for clients in France is composed of all possible pairs of auditors. The total number of all possible pairs in the choice set equals to 22.[12] The deterministic utility of client i in period t choosing a single auditor j follows the same specification as equation (3.1) in both markets. However, the utility of choosing a pair of auditors is not simply the sum of individual utility of choosing two single auditors, because the cooperation process between different auditors may vary vastly due to concerns about the reputation, technology platform, auditor liability and so on. Compared with single audit, the unique feature of joint audit hinges on the pair effect that varies across different combinations of auditor types. The most straightforward way to capture the pair effect between two audit

[11] According to French commercial law, statutory joint audit is required when firms register in France and issue the report on consolidated financial statement.

[12] Since small auditors also include many small audit firms, around 200 in France, clients can choose two small different auditors as a pair. Thus the total number of possible combination of pairs is given by $\binom{7}{2} + 1 = 22$.

firms is to define them pair-wise, i.e.for each possible combination of auditor i and j. It is, however, almost impossible to estimate these pair-wise combination effect due to difficulties in computation and identification. Motivated by the observation in the data that clients are interested in certain combinations of different groups of audit firms as in table (3.3), we think group-wise combination are perfect candidate for measuring the interesting pair effect with little loss of generality as well as for identification. The group wise combinations should capture the different preferences among different pairs well also because auditors within the same group are considered quite similar, such as the Big Fours and the two medium auditors.

Auditors are categorized into three mutually exclusive groups, G_L, G_M, G_S; the group G_L denotes the Big Four; G_M includes two medium audit firms, i.e. top5 and top6, and small auditors in group G_S. In addition, we assume the pair effect is the same for all audit firms in the same group:[13]

$$\Gamma(j,k) = \begin{cases} \Gamma_{LL}, & \text{if } (j,k) \in (G_L \times G_L); \\ \Gamma_{LM}, & \text{if } (j,k) \in (G_L \times G_M) \bigcup (G_M \times G_L); \\ \Gamma_{LS}, & \text{if } (j,k) \in (G_L \times G_L) \bigcup (G_S \times G_L); \\ \Gamma_{MM}, & \text{if } (j,k) \in (G_M \times G_M); \\ \Gamma_{MS}, & \text{if } (j,k) \in (G_M \times G_S) \bigcup (G_S \times G_M); \\ \Gamma_{SS}, & \text{if } (j,k) \in (G_S \times G_S); \end{cases}$$

Moreover, the pair effect of joint audit for each client firm i takes the following parametric form:

$$\Gamma_{it}(j,k) = \sum_l \gamma_{0l}\Gamma_l + \sum_l \sum_r \gamma_l \Gamma_l \tau_{rit}, l = LL, LM, LS, MM, MS, SS$$

[13] Γ_{LM} is the same as Γ_{ML}, the same applies for Γ_{LS} and Γ_{MS}.

where γ_{0l} is the constant utility of choosing each specific combination of auditors; τ_{rit} denotes the client i's attributes that affect the choice of pair, such as size, sector, complexity of financial statement, etc. This term captures clients' heterogeneous preference towards different specific groups as in table (3.3), for instance, large clients may prefer two big four auditors as a pair over one big four combined with one medium auditor; in contrast small clients may prefer one big four coupled with one small auditor or two small auditors as a pair.

The overall utility of client i of choosing a pair of auditor j and k in period t is given by:

$$u^i_{jkt} = V_{ijt} + V_{ikt} + \Gamma_{it}(j,k) + \epsilon^i_{jkt} \tag{3.2}$$

Where ϵ^i_{jkt} is the idiosyncratic preference for a pair of auditors. This is the random component of overall utility, which follows iid type 1 extreme value distribution. Regarding this idiosyncratic preference shock ϵ^i_{jkt}, it captures factors that affect clients' utility associated with the chosen auditors but not included in V_{ikt}, V_{ijt} or pair effect $\Gamma_{it}(j,k)$. From researchers' perspective, we are assumed to know the mere distribution of these shock, but not the realized values.

Since we have assumed the utility of choosing one single small auditor is normalized to be 0, we also normalize the deterministic part of the utility of choosing a pair of small auditors to be 0 for consistency. As a result, the overall utility of choosing a pair of small auditors equals to

$$u^i_{00t} = \epsilon^i_{00t}$$

The term ϵ^i_{00t} denotes random preference shock of choosing this specific pair. It also

follows iid type 1 extreme value distribution. Given the distribution of the random shock, the probability of client i of choosing a pair of auditor j and k in period t conditional on client's and auditors' attributes equals to

$$Pr^{it}_{(j,k)} = \frac{exp[V_{ikt} + V_{ijt} + \Gamma_{it}(j,k)]}{1 + \sum_{l_2=l_1+1}^{6} \sum_{l_1=0}^{5} exp[V_{il_1t} + V_{il_2t} + \Gamma_{it}(l_1,l_2)]} \tag{3.3}$$

The choice probability $Pr^{it}_{(j,k)}$ in equation (3.3) is

$$\begin{aligned} Pr^{it}_{(j,k)} &= Pr(u^{it}_{(j,k)} > u^{it}_{(n,m)}, \forall n \neq i, m \neq k) \\ &= Pr(\epsilon^i_{jkt} - \epsilon^i_{nmt} > V_{int} + V_{imt} + \Gamma_{it}(n,m) - \Big(V_{ikt} + V_{ijt} + \Gamma_{it}(j,k)\Big), \forall n \neq i, m \neq k\Big) \\ &= \int_{A_{11}} \dots \int_{A_{nm}} \dots \int_{A_{77}} dF(\epsilon^i_{jkt} - \epsilon^i_{11t}) \dots dF(\epsilon^i_{jkt} - \epsilon^i_{nmt}) \dots dF(\epsilon^i_{jkt} - \epsilon^i_{77t}) \end{aligned}$$

Set $A_{nm} = V_{int} + V_{imt} + \Gamma_{it}(n,m) - \Big(V_{ikt} + V_{ijt} + \Gamma_{it}(j,k)\Big)$, $\forall n \neq i, m \neq k$. Given the type 1 extreme value distribution of ϵ^i_{lkt} for all l and k, the difference of $\epsilon^i_{jkt} - \epsilon^i_{nmt}$ follows the logistic distribution, which yields to a closed form solution for the above integration as,

$$Pr^{it}_{(j,k)} = \frac{exp[V_{ikt} + V_{ijt} + \Gamma_{it}(j,k)]}{1 + \sum_{l_2=l_1+1}^{6} \sum_{l_1=0}^{5} exp[V_{il_1t} + V_{il_2t} + \Gamma_{it}(l_1,l_2)]}$$

The constant number 1 is from the normalization of choosing small auditors ($n = 7$), i.e., $V_{17t} = 0$ and $\Gamma_{it}(7,7) = 0$.

$Pr^{it}_{(j,k)}$ represents the probability of client i choosing a pair between auditor i and j in period t. As the function form indicates, this probability is monotonically increasing with the utility derived from each single auditor as well as the pair effect between these two auditors.

3.3.3 Audit Fees

As mentioned before, we only observe audit fees for real matches between clients and auditors. Following the approach adopted by Gerakos and Syverson (2013), we also estimate what audit fees a client would have expected to pay had it hired an audit firm other than the one we observed in the data. A large body of literature has demonstrated that audit fees are associated with measures of client size, client risk, and client complexity as well as auditors' characteristics (Hay et al., 2006). Size measured in clients' total asset generally accounts for a large proportion of the variation in audit fees (Hay et al., 2006). In particular, we use the logarithm of clients' total asset to capture the economy of scale in common practice. Complexity is measured by the number of product segment, number of foreign subsidiaries as well as the number of operating business sectors. We use leverage ratio and current ratio to capture the clients' risk. Loss indicator (a dummy variable that equals 1 if loss occurs) and return on assets (ROA) are used to capture clients' profitability. We also control for price to book ratio, growth in sales in prior year, dummy variable to capture whether the firm was a client of the auditor in prior year, industry fixed effect using Fama-French 12-industry classification[14] and time fixed effect in equation (3.4).

$$\ln(p_{ijt}) = \bar{p}_{jt} + \sum_{r} \beta_r \tau_{rit} + \mu_{jt} \tag{3.4}$$

Where $\bar{p}_{jt}$ is the basic audit fee charged by each auditor j in period t and is constant across all clients; the premium of audit fee varies across clients and it is assumed to be a linear function of client's characteristics, equal to $\sum_r \beta_r \tau_{rit}$. Variable μ_{jt}

[14] We run robustness checks for different industry classifications and the results remain similar.

denotes the iid normally distributed error term.[15] This equation (3.4) implicitly assumes that the rule of setting audit fees is a common knowledge between auditors and clients. Hence clients know exactly how much audit fees they would expect to pay if they decide to switch another auditor.

3.3.4 Endogenous Audit Fees

An obvious concern in the demand estimation are the endogenous audit fees. If we leave some unobserved or unmeasured auditor attributes, e.g., audit quality and reputation, etc, in the error term, the audit fees charged by each auditor will be correlated with the error term, i.e., $cov(p_{ijt}, \xi_{jt}) \neq 0$. As Gerakos and Syverson (2013) suggested, we can use the supply shock among audit firms as an instrument variable to correct the upward biased coefficient of audit fees. Intuitively, if there were mergers and acquisitions (M&A) between clients, the supply structure of audit firms would be changed because one of transaction parties in M&A has to drop the original audit firm. In the next period, the dropped audit firms will use attractive audit fees to compete for new clients to compensate the client loss from M&A. Therefore, the supply shock induced by M&A between clients in the previous period is correlated with audit fees (p_{ijt}) but uncorrelated with demand shifts (ξ_{jt}).

However, differing from their procedure of dealing with endogenous issue, we use the same instrument variable, but apply the control function approach which is more appropriate in the discrete choice model. In the literature of health economics, the way used by Gerakos and Syverson (2013) is the two-stage predictor substitution (2SPS) while the control function approach is called two-stage residual inclusion

[15] In the current version of this paper, we only use OLS to predict the audit fees. The estimation results show such approach is sufficient.

(2SRI). 2SRI is generally statistically consistent for nonlinear models, but 2SPS is not by Terza, Basu and Rathouz (2008).[16] The general idea underlying the control function correction is to find a proxy for the unobserved auditor attributes ξ_{jt}. With the proxy of ξ_{jt} in the demand estimation, the variation of endogenous audit fee will be independent of the error term. And the estimation result of the standard approach would become consistent (Petrin and Tain, 2010). More precisely, we first use z_{t-1}, the ratio of three-digit SIC industry assets merged in the prior year to instrument the variation of audit fees in the current period as in equation (3.5).

$$\ln(p_{ijt}) = \bar{p}_{jt} + \rho_0 z_{t-1} + \sum_r \rho_r \tau_{rit} + \mu_{jt} \tag{3.5}$$

μ_{jt} and ξ_{jt} are independent of z_{t-1} and τ_{rit}, but are not independent of each other. The key idea of the control function approach is that we can use μ_{jt} as the proxy variable for unobservable attributes ξ_{jt} such as audit quality and then obtain the consistent estimators of demand preference condition on it. After the first stage regression of equation (3.5), residual $\hat{\mu}_{jt}$ enters the demand estimation in the second stage. The general control function approach allows for a flexible function form of $\hat{\mu}_{jt}$ in the second-stage estimation

$$\xi_{jt} = h(\hat{\mu}_{jt}), \tag{3.6}$$

where $h(\hat{\mu}_{jt})$ denotes the control function. The simplest form of $h(\hat{\mu}_{jt})$ would be linear function. Alternatively, a high order polynomial approximation can be used for robustness check. It is worth mentioning that the unobserved auditor attributes

[16] Please find the details of control function approach in Petrin and Train (2010).

ξ_{jt} which do not vary across clients implicitly make it feasible to apply the control function approach. Otherwise, we can not obtain the proxy for audit quality from the unobserved audit fees.

Regarding the unobserved auditor attributes ξ_{jt}, it can be generally interpreted as anything (not necessarily audit quality) that are correlated with the audit fee. Such term is assumed to be constant across clients, which assume that for instance one auditor should provide the same service quality to all clients. However if it were allowed to vary across clients, it will be confounded with preference shock that cannot be identified from the data. We can normally interpret it as quality because quality is one common item that could generate the typical endogenous problem. And it also affects the audit fees and auditor choices. In our case, it can be regarded as a mixture between audit quality and litigation liability, or something else that are (approximately) constant across clients, correlated with audit fees and also affect clients' auditor choice. Then this term should be explained consistently in the control function approach.

Similar to Gerakos and Syverson (2013), Table (3.1) shows that the coefficients of "Scaled merged assets" are significantly negative, which means the bigger mergers and acquisitions of clients are associated with lower audit fees in the following period. The industry wise shock presented by M&A activities creates a downward price effect. Hence we can use supply shock from M&A between clients as a valid instrument for audit fees.

Figure (3.1) illustrates the plots of actual versus predicted audit fees in both France and UK. As shown in Figure 1, the predicted audit fees fit well with the actual audit fees. The correlation between predicted audit fees and actual audit fees is larger than 0.93 in both countries. The average magnitude of audit fees in

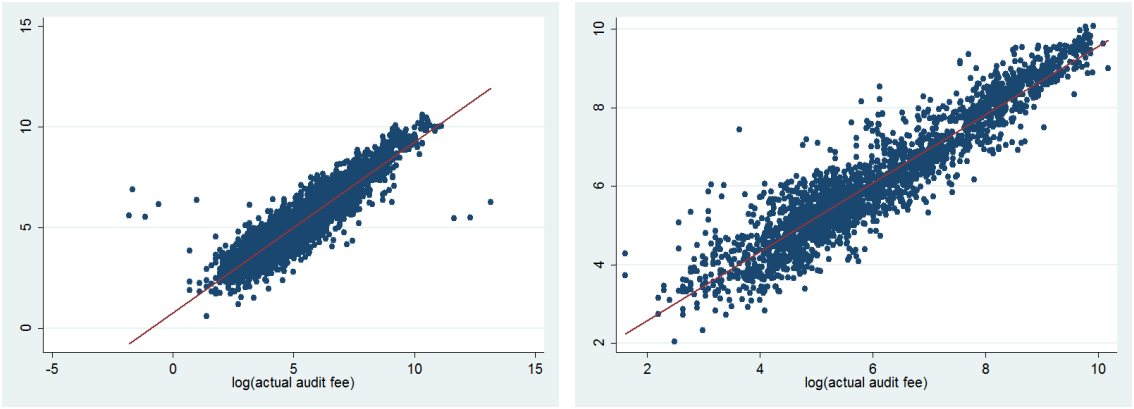
Table 3.1: M&A between clients as supply shock during 2005-2012

ln(Audit Fees)	UK	France
scaled merged assets	-0.1653**	-0.2878***
	(0.0560)	(0.000)
ln(assets)	0.5072***	0.6842***
	(0.0219)	(0.0144)
leverage ratio	0.0004***	-0.0026
	(0.0001)	(0.0021)
No. geographical subsidiary	0.0945***	0.0251**
	(0.0105)	(0.0083)
No. product segment	0.0865***	0.0283
	(0.0136)	(0.0196)
current ratio	-0.0042*	-0.1140***
	(0.0019)	(0.0306)
price to book value	0.0007	0.0073**
	(0.0007)	(0.0026)
sale growth	0.0001***	0.0053
	(0.0000)	(0.0516)
tenure	-0.0002	0.0220
	(0.0181)	(0.0362)
cross listed	0.2774***	0.2429***
	(0.0679)	(0.0510)
receivable to assets	0.1217*	1.0523***
	(0.0649)	(0.1589)
ROA	-0.0024***	-0.0089*
	(0.0007)	(0.0041)
loss dummy	0.0611	0.1041*
	(0.0523)	(0.0524)
location	0.1395***	0.1766***
	(0.0323)	(0.0433)
constant	-0.5976*	-3.0979***
	(0.2727)	(0.2704)
Auditor fixed effect	Yes	Yes
Year effect	Yes	Yes
Industry fixed effect	Yes	Yes
Observations	6159	2392
Adjusted R^2	0.6612	0.9122

Notes: Standard errors clustered at industry-level; ***, ** and * denote significance at the 1%, 5% and 10%.

Scaled merge assets denotes the ratio of occurred M&A assets over total assets in three-digit SIC industry; cross listed is a dummy, equal to 1 if the client is cross listed in the US stock market; location is an indicator whether the headquarter of the client is located in the capital of the country.

Figure 3.1: Actual v.s. predicted audit fees



(a) UK (b) France

the UK is relatively higher and a larger proportion of them distributed between the range of above 5 and 10 compared with the distribution in France,[17] The difference is mainly driven a larger proportion of big clients measured in assets in the UK.

3.4 Data

The sample in our study consists of the listed firms in the UK and France with available data. The sample period lasts from 2005 to 2012. Our data are from commercial databases and publicly available financial reports of listed firms. The data on client attributes and auditor-client matches are from Amadeus database. We collect the audit fees from Datastream for the UK firms and hand-collected data from annual reports for French firms. And we also obtain the mergers and acquisitions data from SDC database.

Table (3.2) presents the descriptive statistics.[18] Table (3.9) in the appendix

[17] The scale in Figure (3.1) equals to the logarithm of thousand audit fees in the local currency, i.e., GBP for the UK and EURO for France.

[18] The descriptive statistics show that some variables take on extreme values, e.g., current ratio and price to book ratio. Our findings are robust to winsorizing these variables at the 1% and 99% percentile.

shows the descriptive statistics for the distribution of client firms across industries.

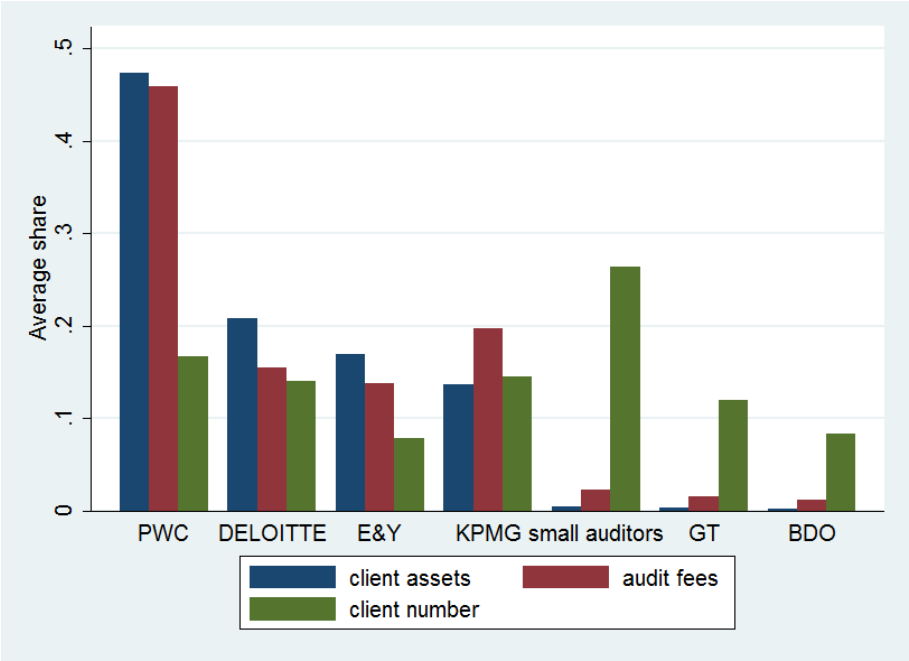
Table 3.2: Summary of descriptive statistics in the UK

			UK		
Variable	**Mean**	**SD**	**P10**	**P90**	**N**
MA ratio (MA_{it-1})	1.434%	0.091	0	9.968%	7100
log(total assets)	11.323	2.343	8.567	14.607	7100
Leverage ratio	16.354	18.496	0	136.190	7100
Num-Geo	1.767	1.675	0	4	7100
Num-Prod	1.644	1.022	1	3	7100
Current ratio	3.432	15.394	0.655	5.810	7100
Price to book ratio	2.315	18.675	0.400	5.810	7100
Growth of sales	0.207	0.860	-0.239	0.658	7100
Receivables	0.165	0.346	0.015	0.338	7100
ROA	-0.731	15.834	-13.655	12.290	7100
Variable	**mean**	**sd**	**obs (dummy=1)**	**obs (dummy=0)**	**N**
Loss dummy	0.382	0.486	2712	4388	7100
London	0.335	0.472	2378	4722	7100
Cross list dummy	0.101	0.301	717	6383	7100

			France		
Variable	**Mean**	**SD**	**P10**	**P90**	**N**
MA ratio (MA_{it-1})	0.137%	0.017	0	0	2392
log(total assets)	13.900	2.053	11.344	17.020	2392
Leverage ratio	23.297	15.112	3.79	43.810	2392
Num-Geo	2.015	2.417	0	6	2392
NUM-Prod	2.499	1.416	1	4	2392
Current ratio	1.436	0.775	0.780	2.310	2392
Price to book ratio	1.914	3.923	0.660	3.490	2392
Growth of sales	0.096	0.392	-0.094	0.264	2392
Receivables	0.241	0.140	0.084	0.443	2392
ROA	4.966	8.251	-2.360	13.030	2392
Variable	**mean**	**sd**	**obs (dummy=1)**	**obs (dummy=0)**	**N**
Loss dummy	0.161	0.368	386	2006	2392
Paris	0.360	0.480	862	1530	2392
Cross list dummy	0.209	0.405	500	1892	2392

As shown in Figure (3.2), the average market share measured by number of clients over the sample period is around 13% among the big four auditors in the UK. For small auditors, their total market share in terms of the number of clients is up to 27% average over time, but there are between 200 and 300 small auditors in each period, resulting in the market share per small auditor almost trivial in the

Figure 3.2: Market shares of audit firms in the UK during 2005-2012



market. Based on the average market share measured by the number of clients, the audit market doesn't seem so concentrated. However, if we use the total assets audited by each auditor to measure the market share, the audit market is basically dominated by the Big Four as expected in the UK. The sum of this average share by the Big Four is more than 90%, and the market leader PwC alone even reach 47%, almost half of the total market. In this case, two medium auditors- BDO and Grant Thornton also become marginal in the market. With respect to the share of audit fees, it is positively correlated with total assets audited by each auditor. In brief, the big clients are audited by the Big Four and the other clients are shared by medium and small auditors.

As joint audit is mandatory implemented in France, Table (3.3) describes the distribution of different pairs between audit firm during the sample period. L denotes one of the big four audit firms; M denotes one of the medium audit firms; S denotes

Table 3.3: The distribution of different pairs in France 2005-2012

Group	Percentage	Client Size		
	(%)	I	II	III
LL	24.18	9.48	18.60	44.64
LM	18.17	7.73	17.39	29.43
LS	37.99	48.88	44.20	20.70
MM	0.99	1.75	1.21	0.50
MS	7.89	12.72	10.39	0
SS	10.77	19.45	8.21	4.74

one of the small audit firms in France. LL denotes a pair composed of any two of the big four audit firms. LM denotes a pair composed of one of the big four audit firms and one of the medium audit firms. LS denotes a pair composed of one of the big four audit firms and one of the small audit firms. Client size I, II, and III denotes small, medium and large clients measured in total assets respectively.[19] It is clear that clients have heterogenous preference for specific pairs under the joint audit policy as in Table (3.3). Although LS is the most prevalent pair in general, around 38%, large clients strongly prefer LL and LM to LS; while it remains the most preferred pair for medium and small clients.

Table (3.4) shows the basic statistic summary of audit fees charged by each auditor in both countries. We first divide both original fees by thousand and then take the logarithm, leading to the observations in (3.4). It is not surprise that the big four auditors on average charge a higher audit fee than the medium auditors and similarly the medium auditors charge higher fees than the small auditors, because the audit fees mainly depends on the workload which is measured by clients size. Compared with France, the audit fees charged by small auditors, medium auditors and the Big Four in the UK on average is relatively higher, but with a smaller vari-

[19] The total assets are discretized by the 3-quantiles. So the top 33% are large client, the medium 33% are medium client and the bottom 33% are small clients.

Table 3.4: Summary of audit fees in France and the UK during 2005-2012

	mean	**sd**	**median**	**min**	**max**	**N**
UK						
PwC	12.871	0.231	12.720	12.674	13.367	1314
E&Y	11.666	0.165	11.576	11.478	11.970	629
Deloitte	11.796	0.127	11.760	11.636	12.087	1111
KPMG	11.984	0.577	11.789	11.630	13.430	1148
GT	9.473	0.306	9.445	8.964	9.914	936
BDO	9.234	0.148	9.192	9.012	9.436	657
Small auditors	6.224	0.211	6.155	5.982	6.593	2114
overall	10.015	2.568	11.571	5.982	13.430	7909
France						
PwC	11.047	0.614	11.131	8.082	11.359	232
E&Y	11.754	0.750	11.882	8.050	12.122	389
Deloitte	11.161	0.556	11.209	7.979	11.516	350
KPMG	11.076	0.659	11.232	8.038	11.396	299
Mazars	10.867	0.780	11.175	7.762	11.406	254
GT	8.758	0.911	8.589	4.771	9.724	87
Small auditors	5.709	0.663	5.402	4.558	6.585	819
overall	9.280	2.688	11.069	4.558	12.122	2430

ance. The composition of two medium auditors is different across the two countries. The fifth largest auditor in the UK is Grant Thornton (GT) and Mazars in France; while the sixth auditor auditor is BDO in the UK and GT in France.The approach we label these auditors are merely based on their relative ranking in each market. The label of medium auditor represents the auditors'position in the markets as the fifth and sixth largest auditors. Therefore, the label for the medium auditors can be commonly regarded as a ranking or recognition of auditor reputation in both countries.

3.5 Demand Estimation Results

3.5.1 Demand Estimation Results in French market

The demand model is estimated in two steps as required by the control function approach. We first regress the endogenous variable (audit fee) on other observed clients' characteristics and the instruments. The corresponding estimation results have been reported in Table (3.1). The residuals of first-stage regression are used to compute the control function, which enters the discrete choice model as an extra variable in the second step. Then we implement bootstrap to correct the standard error for the two-step estimators (Petrin and Train, 2010).

Table (3.5) presents the general preference of public listed firms in France estimated by conditional logit approach. The first column in this table does not use control function to address the endogenous audit fee; while the other two does and allows for a different form of control function. As expected, the control function approach helps to correct the biased coefficient of willingness to pay the audit fees in column 1, from -0.4 to -0.5 as in column 2. In column three, we add a higher order term in the control function, but the estimated parameter is fairly close to that in column 2 and the square term is not significant. Thus we stick to the estimation results in column 2 and use them for counterfactual analysis in next subsection. The proxy for unobserved auditor attributes also have the positive sign and the coefficient is significant, which implies the control function might be able to provide a good approximation for audit quality if we consider such unobserved audior attributes as audit quality.

The estimation results mainly represent clients' preference for individual auditor. The variables such as tenure, industry leader and industry specialist are all

Table 3.5: Demand Estimation in France

industry leader	3.8726***	3.9275***	3.9301***
	(0.5141)	(0.5901)	(0.5892)
industry specialist	4.1172***	4.1692***	4.1675***
	(0.4647)	(0.5167)	(0.5145)
tenure	22.6902***	25.2915***	24.5025***
	(3.3080)	(5.0744)	(5.3123)
ln(audit fee)	-0.4422*	-0.5003**	-0.5029**
	(0.2338)	(0.2356)	(0.2374)
PwC	-5.9710***	-5.8629***	-5.6679***
	(2.2027)	(2.1539)	(2.1270)
E&Y	-6.0621**	-6.0183***	-5.8149**
	(2.3802)	(2.3253)	(2.3095)
Deloitte	-5.1957***	-4.8842***	-4.6111***
	(1.1578)	(1.0613)	(1.1060)
KPMG	-5.0292***	-5.1046***	-4.9487***
	(0.8568)	(0.7737)	(0.7794)
Mazars	-6.3394***	-6.1735***	-5.8366***
	(1.8086)	(1.7496)	(1.7375)
GT	-4.4489**	-4.7346**	-4.8091**
	(1.9534)	(1.9274)	(1.8683)
PwC*ln(assets)	0.4122**	0.4013**	0.3819**
	(0.1758)	(0.1707)	(0.1707)
E&Y*ln(assets)	0.4248**	0.4181**	0.3981**
	(0.1781)	(0.1734)	(0.1728)
Deloitte*ln(assets)	0.3434***	0.3185***	0.2948***
	(0.0949)	(0.0865)	(0.0902)
KPMG*ln(assets)	0.3403***	0.3428***	0.3256***
	(0.0663)	(0.0620)	(0.0607)
Mazars*ln(assets)	0.4676***	0.4610***	0.4396***
	(0.1316)	(0.1287)	(0.1278)
GT*ln(assets)	0.2211	0.2515	0.2581
	(0.1703)	(0.1694)	(0.1643)
audit quality		1.9334*	2.6697**
		(1.0020)	(1.0917)
audit quality square			-5.5148
			(4.5755)
pair1*geography	0.1587	0.1691	0.1764
	(0.1564)	(0.1536)	(0.1557)
pair2*geography	0.1133	0.1220	0.1145
	(0.1143)	(0.1092)	(0.1083)
pair3*geography	0.1896	0.1906	0.1889
	(0.1226)	(0.1228)	(0.1223)
pair4*geography	0.0242	0.0273	0.0235
	(0.1306)	(0.1275)	(0.1310)
pair5*geography	-0.1502	-0.1501	-0.1494
	(0.1176)	(0.1149)	(0.1139)
pair1*receivable	-3.9552***	-3.7406***	-3.4206***
	(0.8560)	(0.7670)	(0.7621)
pair2*receivable	-3.1668***	-3.6651***	-3.4826***
	(1.1258)	(1.0466)	(0.9643)
pair3*receivable	-0.2766	0.1385	0.1863
	(0.6323)	(0.6902)	(0.6884)
pair4*receivable	-1.1392	-0.9592	-0.8633
	(4.2133)	(4.1956)	(3.9982)
pair5*receivable	0.2172	0.7096	0.8033
	(1.4453)	(1.4997)	(1.3760)
pair1*location	1.7254***	1.7663***	1.7866***
	(0.4076)	(0.3750)	(0.3669)
pair2*location	0.2319	0.1530	0.0870
	(0.4269)	(0.3896)	(0.3809)
pair3*location	0.9708**	0.9327*	0.9145*
	(0.4799)	(0.4937)	(0.5005)
pair4*location	-15.7572***	-17.4911***	-16.2370***
	(0.6808)	(0.6870)	(0.6735)
pair5*location	0.3731	0.4281	0.5002
	(0.5297)	(0.5639)	(0.5300)
R^2	.8907496	.8911568	.8913553
$-L$	-401.2769	-399.7815	-399.0523

Standard errors clustered at industry-level.

Notes: ***, ** and * denote significance at the 1%, 5% and 10%.

significant and have the expected sign.[20] That is to say, given everything else being equal, public listed firms prefer low audit fees, more likely to choose the auditor that already has a long run tenure, and also prefer auditors that are industry leader and specialist. The interaction terms between clients' size and auditors' fixed effect capture clients' heterogeneous preference. The positive sign of these interaction terms suggest that client with larger size prefer the top 6 auditors compared with small auditors. The magnitudes of interactions on the top 5 auditors are similar but much larger than the interactions on one medium auditor (GT), which means that the Big Four are more preferable by large clients and only one of the two medium auditors can compete with the Big Four for these large clients. Bigger clients would strongly prefer the big four auditors over the medium auditors, although the the top six auditors are preferred by big clients in general.

Pair1 to pair6 are the pair dummies, representing big-big, big-medium, big-small, medium-medium, medium-small and small-small pairs between audit firms respectively.[21] The small-small pair (pair6) is used as the base due to the normalization and collinearity. The pair dummies are interacting with clients' attributes including financial complexity measured by the number of foreign subsidiaries, risk measured by the ratio of receivable over total assets and the location of firm's headquarter. Location equals to 1 if this client is located in the capital of the country, otherwise 0. As suggested by previous research (Craswell and Francis ,1999; Ferguson et al., 2003), audit engagements are administered by an audit team typically located in an office in the same city as the clients' headquarters. And the two cities consid-

[20] Detailed definition of these variables are present in the Appendix. ln(assets) is the natural logarithm of the client's total assets.

[21] The estimation results in Table (3.5) do not contain pair fixed effect because of the identification issue. The pair dummies are just certain linear combination of individual dummies, thus we can not identify pair fixed effect alone when controlling for clients' preference for each individual auditor.

ered in our setting are Paris and London which can be considered to have more capital and more personnel at their offices in general. So the use of the headquarter locations could capture some extent of the office level competition and clients' willingness to pay for better auditor for higher costs. Since the pair1 and pair3 (big-big and big-small) are strongly preferred by clients located in the capital, the results does confirm that clients would like to pay for large premium for auditors with high reputation if their headquarter is located in the capital of a country. As in Table (3.5), the interaction between clients' financial complexity shows a positive sign, though not significant. This means as the financial structure of public listed firms become more complicated, these clients would prefer pairs with at least one auditor from the Big Four or medium-tier. It confirms the perception that the Big Four are more capable of handling financially complicated clients. The coefficient of interaction between receivable and pair fixed effect reach significantly negative sign in such pairs as big-big and big-medium. This suggests if clients are getting risky in terms of high ratio of receivable over assets, they will be less likely to choose pairs with at least one auditor from the Big Four. This indicates the Big Four might avoid risky clients because their better risk management. Regarding the interaction between location and pair dummies, we find significantly mixed sign for distinguished pairs. Clients with the headquarter in the capital most prefer big-big pair and then big-small pair, but strongly dislike medium-medium pair compared with small-small pair base. These results confirm that there is the pair effect under the joint audit policy. Moreover clients have heterogenous preference for specific pair combinations in addition to its original preference for single auditor.

3.5.2 Model fit for the UK market

In the beginning of this paper, we have imposed a basic assumption that publicly listed firms have the same preference for auditors conditional on their attributes in both countries. We will validate this assumption in this section in spite of a variety of country differences. Although Table (3.5) presents the results of the demand estimation in the French market, it also contains the information on the public listed firms' preferences for individual auditors. These parameters for the variables such as tenure, industry leader, industry specialist, individual auditor dummy and its interaction with assets are assumed to be the same as clients in the UK. Then we use them to predict the single auditor choice for clients in the UK and compare the prediction with actual choice observed in the data.

$$u_{ijt}^{uk} = V_{ijt} + \epsilon_{ijt}$$

The utility of client i choosing single auditor j at period t in the UK market is represented by u_{ijt}^{uk}. It composes of two parts: the deterministic part V_{ijt}, exactly the same formula as in France and the random part ϵ_{ijt} also iid extreme value type 1 distribution. Similarly, the utility of choosing small auditors is normalized as:

$$u_{i0t}^{uk} = \epsilon_{i0t}$$

Given this utility specification as well as the preference for single auditors derived from French market, we can compute the probability Pr_{ijt}^{uk} of client i choosing each single auditor j in each year t in the UK conditional on her attributes τ_{it}. We then use the corresponding highest probability as the predicted choice to compare with

actual choice in the data.

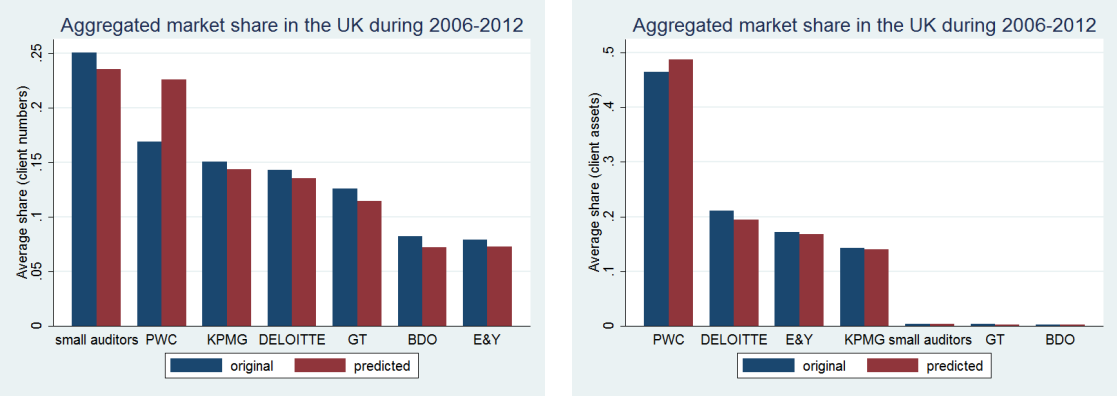
Table 3.6: Model fit in the UK market during 2006-2012

Actual/Predicted choice	PwC	E&Y	Deloitte	KPMG	GT	BDO	Small auditor
PwC	93.8%	0.5%	1.4%	1.2%	0.9%	0.1%	2.1%
E&Y	10.2%	84.2%	1.4%	1.2%	0.6%	0.4%	1.8%
Deloitte	8.3%	1.0%	86.7%	0.7%	0.8%	0.3%	2.2%
KPMG	5.1%	0.9%	1.1%	89.2%	0.8%	0.9%	2.2%
GT	8.1%	0.5%	1.6%	1.3%	83.5%	0.5%	4.5%
BDO	7.1%	0.6%	1.4%	1.6%	0.8%	82.2%	6.3%
Small auditor	9.9%	0.3%	1.2%	1.0%	0.9%	0.4%	86.3%

Table (3.6) shows how the preference parameters derived from French market fit the observations in the UK. The row denotes clients' actual choice and the column displays the predicted choice according to highest probability. The first row should be interpreted as conditional on the actual choice of clients choosing PwC during 2006 to 2012, the model predicts that 93.8% of these clients choose PwC, which coincides with the actual choice. And 0.5% of these clients are predicted to choose Deloitte and so on. Therefore, the numbers on the diagonal of Table (3.6) indicate the fitness of the preference parameters. On average 86.5% of the predicted choice is consistent with actual choice in the UK, in particular for clients that actually choose PwC, the correctness of prediction reaches 93.8%. Regarding clients that choose other auditors in the UK, on average around 85% predictions coincides with actual choice and PwC seems to be the second best choice among these clients. Please note that we only use UK sample from 2006 to 2012, because the variable tenure has more than 67% missing values in the first year 2005. Consequently, we drop the first year 2005's observations in the UK and all the following counterfactual analyses are also based on the sample from 2006 to 2012.

Figure (3.3) presents another measure how the preference parameters fits the

Figure 3.3: Model fit of the UK during 2006-2012



(a) Clients' number

(b) Clients' asset

UK data in terms of aggregated market share. In general, the predicted market shares by both number of clients and assets of clients fit the actual share quite well. However, the aggregated share of PwC is overpredicted in both measures, because PwC is systematically over predicted for clients that choose other auditors as shown in Table (3.6).

3.6 Counterfactual Policy Analysis

The European Commission has been concerned about the high concentration of Big Four in the UK market. France is the only country that implements mandatory joint audit policy and has the least concentrated audit market in Europe. The debate on this policy has been controversial. In this section, we would like to provide a guideline for policy makers on the potential impact of joint audit policy in the UK market.

3.6.1 Change of Market Share under Joint Audit in the UK

If public listed firms in the UK were mandated to choose two audit firms under joint audit policy, two possible cases would arise. One case would be that clients still keep the current auditor and choose a second auditor. The other one would be that clients drop the current auditor and choose two new auditors for the joint audit service. The first case is more likely to be expected to be true because the variable tenure in the demand estimation shows that clients prefer to establish a long-term relationship with audit firms. Therefore, we simulate how the audit market structure evolves in the UK under the joint audit policy, in which clients keep the original auditor and additionally choose a second audit firm. Then the utility of client i in period t keeping original auditor j_0 and adding another auditor j_1 in the UK would be

$$u^{uk}_{ij_0j_1t} = V_{ij_0t} + V_{ij_1t} + \Gamma_{it}(j_0, j_1) + \epsilon_{ij_0j_1t}$$

$\Gamma_{it}(j_0, j_1)$ represents the pair effect between auditor j_0 and j_1, and it varies across client i according to their individual characteristics. It is worth mentioning how we calculate the predicted audit fee under joint audit policy. The two auditors are supposed to share workload and charge each individual audit fee associated with the separated workload. The criteria for dividing workload in the counterfactual is derived from the observed ratio in the French market. In addition to the shared workload, the individual auditor's attributes also multiply the associated workload ratio to enter V_{ij_0t} and V_{ij_1t} under joint audit policy. Take individual fixed effect

for example, client i can enjoy all the utility from the fixed effect (reputation) of auditor j_0 under single audit, while under the joint audit, client i's utility from original auditor j_0 would get a discount because auditor j_0 now only provide part of auditing service under the joint audit. Given the each individual predicted audit fee $\hat{p}_{ij_0t}$ and $\hat{p}_{ij_1t}$, clients' preference parameters, auditors' attributes, and the random draw of the idiosyncratic preference shock, we can compute each client's optimal choice in every period. As a result, we calculate every auditor's new market share in the counterfactual joint policy.

Figure 3.4: Change of market shares in the UK (clients' number)

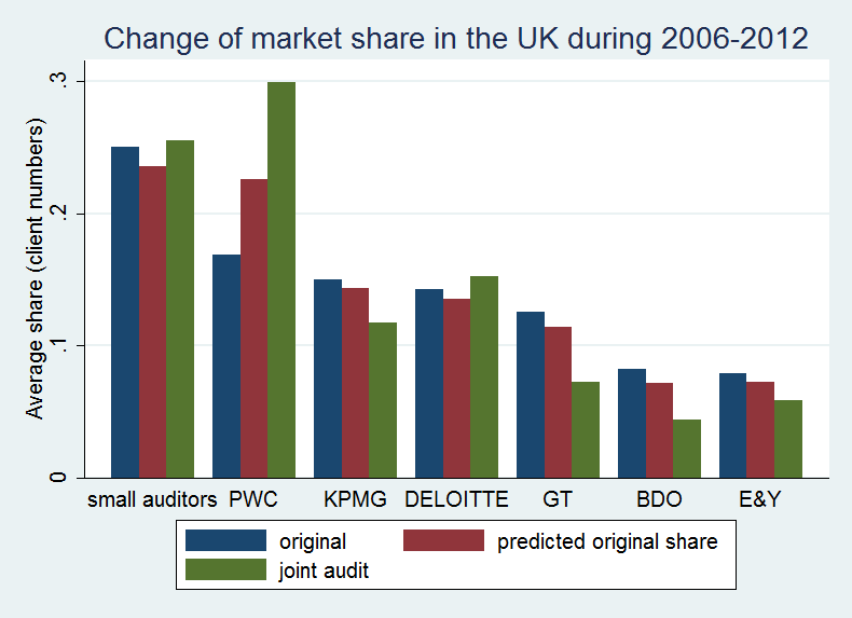
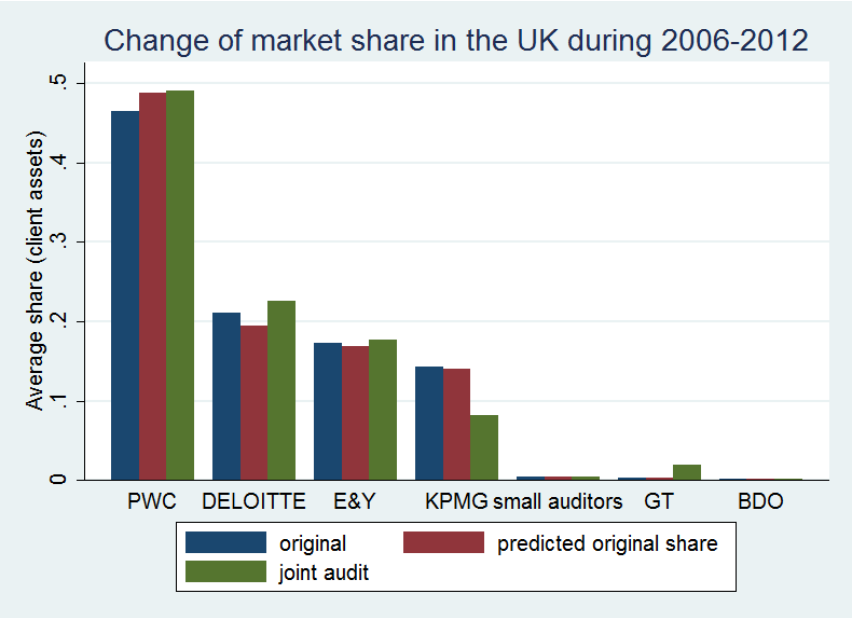


Figure (3.4) and Figure (3.5) show the market share would change for each auditor in terms of number of clients and assets of clients respectively under the joint audit policy. In both figures, we plot the actual share observed in the data, the predicted share under single audit as in previous subsection and the share under joint audit. The predicted share under single audit provides another necessary benchmark to compare with counterfactual scenario because it helps to provide a

Figure 3.5: Change of market shares in the UK (clients' asset)



robustness change in the market share with controlling for the prediction error.

As shown in the figures, the market share of the Big Four changes quite differently from each other in both on the number of their clients and the asset size of their clients. The market leader PwC would have a significant increase in the share of clients' number, from originally around 17% increase to around 30% under joint audit policy. Its market share of clients' assets would also have a fair increase, from around 46% to around 49% average over time. The direct follower after Pwc in the UK market is Deloitte, who also experience a slight increase in both market share measures. The third Big Four- Ernst & Young's share of clients' assets would almost stay the same as in single audit, while its share of clients' number would have a fair decrease. The forth Big Four KPMG in the UK market would experience a sharp drop in the share for both number of clients and assets of clients. The market share loss for KPMG and Ernst & Young seems to justify their incentive to lobby against this potential reform.

It is interesting to see how the two medium size auditors change their market share since they are quite in favor of this policy reform (Jones 2012). As both figures shows, Grant Thornton (GT) and BDO would lose at least one third of their original share in number of clients, but would benefit substantially for their share in clients' assets. This market share measure for Grant Thornton would quintuple, from originally 0.36% to around 1.8%. This means Grant Thornton would be able to compete for some big clients even though have less total amount of clients under the joint audit. However for BDO, this measure would increase very tiny, almost the same as before. With respect to small auditors, they would get relatively bigger share of the pie than before. Although on average, their market shares still are trivial to the bigger auditors as in Figure (3.4) and Figure (3.5). Their total market shares would increase by 2% on average over time in terms of both clients' number and assets.

Table 3.7: Patterns of chosen pair under the joint audit policy in the UK

	Big4	Medium	Small
PwC	0.8904	0.0891	0.0205
E&Y	0.9699	0.0115	0.0186
Deloitte	0.9628	0.0177	0.0195
KPMG	0.9612	0.0181	0.0208
GT	0.9564	0.0043	0.0393
BDO	0.9294	0.0072	0.0634
Small auditors	0.0295	0.0138	0.9567

Table (3.7) shows detailed pattern how clients choose pairs conditional on keeping their current auditors in the UK. Around 89% clients that originally choose PwC would choose another Big Four to form a pair; and then 9% of them would choose one medium firm as pair, leaving the left 2% to choose a small auditor in a pair. For these clients that originally choose other Big Four auditors, more than 96% of

them would choose another Big Four (most likely PwC) as a pair choice under joint audit, and the remaining has a relatively higher probability to choose small auditors compared with medium auditors. The same pattern holds for clients that choose medium auditors originally. Regarding small auditors' clients, they would like to choose another small auditor as a pair because they do not benefit too much by choosing one Big Four or medium auditor indicated by their preference parameter. The simulation results seems unexpected to some extent because we observe that big-small pair is the generally most prevalent pair choice in France. But Table (3.3) also shows that clients with large amount of assets (the top 33%) have a strict preference ordering which is big-big big-medium, big-small pair and other pairs. Since clients' size in the UK market on average is larger than in France, it is not surprising that most of them would choose big-big pair if joint audit policy were introduced in the UK. Combined this table with previous figure, we can well explain which channel drives the change of the aggregated market share. PwC would lose a few big clients, but harvest more relatively small clients from other Big Four and medium auditors under joint audit policy. That's why its share in number of clients increases much higher than the share in assets of clients. The medium auditor-Grant Thornton would successfully compete for some big clients that originally choose PwC, leading to the soar of its share in clients' assets. Small auditors would benefit very marginally due to distribution of clients' size in the UK. In all, the concentration of the Big Four auditors measured by the sum of their market shares in clients' assets drop slightly because of the rise of the medium auditors under joint audit.

These results show the possible introduction of joint audit would significantly shape up the current market structure in the UK. However, we would like to point out that these results do not include the possible strategic price response from

auditors, especially the Big Four. Since the Big Four have much more market power in the current market, they would react to the policy change by setting a new optimal price in order to compete for more clients. The same applies to other auditors, but they might be in a disadvantaged position to compete. In addition, there would not be any entry or exit of audit firms during the sample period if the joint audit were implemented in the UK. Basically, we focus on the short-run effect of joint audit policy. The general equilibrium model with audit firms entering or exit would enable us to investigate the long-run policy effect, but it is much more complicated and beyond the scope of current version. Hence our current results should be interpreted with caution.

3.6.2 Change of welfare under Joint Audit in the UK

The welfare in this paper is equal to consumer surplus of all clients in the UK since we do not model cost function in the supply side so far. To estimate the change of consumer surplus, we apply the approach developed by McFadden (1999): calculate the expected change in consumer surplus for each client as the expected unit currency transfer required to make that client indifferent between choosing original auditor in the single aduit and choosing new auditors arising under the counterfactuals. Then we sum the change across all clients to obtain the expected total change in consumer surplus.

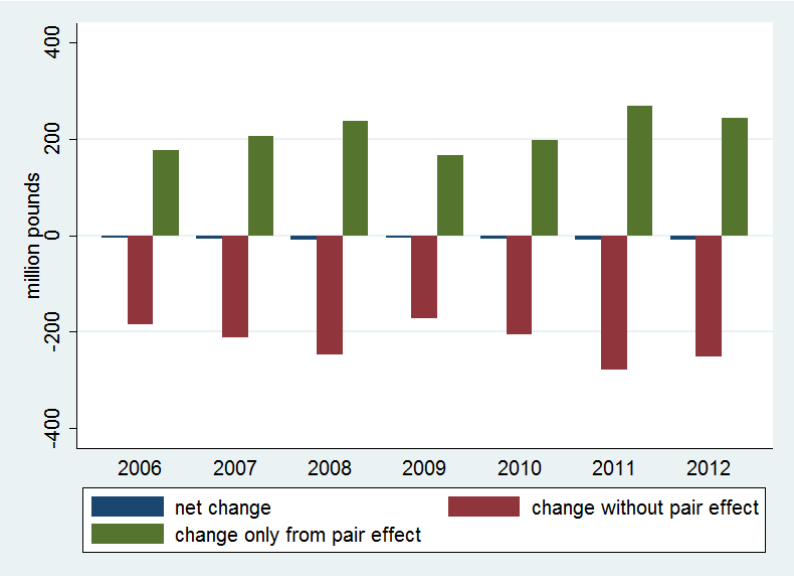
To more specific, to calculate the expected change in consumer surplus for each client firm as the expected money transfer required to make that client indifferent between the original choice set of the status quo and the joint audit choice set arising under the counterfactuals. We sum these changes of surplus across individual clients

to obtain the expected total change in consumer surplus.

$$\max_{k} u^i_{kt}(p_{ikt}, \vec{x}_{ikt}, \epsilon^i_{kt}) = \max_{k_1,k_2} u^i_{k_1k_2t}(p_{ik1t} + p_{ik_2t} - C^i_{k(k_1k_2)t}, \vec{x}_{ik_1t}, \vec{x}_{ik_2t}, \epsilon^i_{k_1k_2t}) \quad (3.7)$$

Where the vector $\vec{x}_{ikt}$ represents all the other factors, besides the audit fee p_{ikt} and idiosyncratic shock ϵ^i_{kt} that affect client i's utility of choosing any auditor j in period t. Suppose in the data we observe client i original chooses auditor j to reach the maximum utility u^i_{jt}, and under counterfactual policy of joint audit, client i chooses the auditor j and k that yields the maximized utility u^i_{jkt}. Then the change of consumer surplus $C^i_{j(jk)t}$ is the pounds transfer that would make the client reach the same utility between the original choice and optimal choice under the counterfactual. In other words, $C^i_{j(jk)t}$ can be interpreted as the compensation in pounds client i could obtain due to enforcement of counterfactual policy. The total change of consumer surplus is the sum of $C^i_{j(jk)t}$ across all clients each period.

Figure 3.6: Change of welfare in the UK after joint audit policy



As a similar procedure to compute the change of market share in the counterfactual, we can simulate each client's optimal auditor choice and then compute the difference of the maximum utility for each client derived in both original and counterfactual world. As shown in Figure (3.6), clients would slightly be worse off over the sample period in the counterfactual joint audit policy, ranging from 9 million GBP to 5.6 million GBP. The estimated average change in welfare over time would decrease by 7.2 million GBP. However, the decomposition of consumer surplus change suggests clients instead would benefit from pure pair effect from joint audit to a great extent, on average around 212 million GBP better off, but unfortunately this compensation is not high enough to balance out the loss from being forced to choose another auditor in the pair.

To mitigate the concern that these simulation results are driven by specific forms, we try alternative utility function forms, i.e., adding several more clients' attributes to interact with pair fixed effect as a robustness check. We first re-estimate all the preference parameters associated with each specification and then use them to simulate the counterfactual results. We find that the change in the direction of above all shares as well as consumer surplus is quite consistent and robust, but the percentage of the change varies across different specifications.

3.7 Conclusion

Within EU, the European Commission green paper (2010) raises the issue of audit market concentration. The UK regulators are also extremely concerned with the concentration of audit market. The report from the House of Lord (2011) indicates that they believe there is a lack of choice in the UK audit market, especially for large

client firms. While a series of policy debates are ongoing, some possible reforms are proposed. In this paper we investigate how one of the possible reforms, namely mandatory joint audit would affect the audit market concentration in the UK. The demand estimation approach allows us to identify clients' preferences to substitute among individual auditors. Using observations in French market, we can measure how listed firms perceive services provided by the Big Four, the medium auditors and the small auditors. In the meantime, we are able to identify how different firms choose different pairs of auditors. In the policy experiment, we force the UK clients to choose another auditor while keep their original auditor under joint audit. Given the preference for individual auditors as well as for pair choices derived from French market, we can simulate how listed firms in UK respond to such policy change and the potential evolution of market structure.

Our demand estimation results show that the public listed firms in both countries have heterogenous preference for the big four auditors, mainly varying across clients' size. While considering the audit market in France, the heterogenous preference is also manifested in the pair choice. That is to say, different groups of listed firms do prefer certain types of pairs, e.g., the bigger firms prefer the combination of having two big four auditors as a pair. After recovering preference parameters, we calculate the market share changes of audit firms and the welfare change of client firms in the UK under the counterfactuals. Our results show that the market leader auditor would experience substantial rise in the share of number of clients as well as a fair increase in the share of clients' assets. The second auditor would enjoy a small growth in the both market share measures. However, for other two big four auditors, they would have to incur market share losses: on average 20% decrease of client numbers and on average of over 25% decrease of client sizes. Even though, both

medium auditors would loss the share of clients' number substantially, one medium auditor-fifth largest player in the UK market-Grant Thornton would quintuple its share of clients' assets after joint audit policy. Another medium auditor BDO would not benefit much from such reform. And the small auditors would benefit very marginally from the joint audit by expanding their market shares by a very tiny percentage. The concentration of the Big Four under joint audit would drop mildly due to the rise of medium auditors. The counterfactual results also indicate that joint audit would increase clients' consumer surplus to some extent due to the positive pair effect, but this pair benefit is not high enough compensate the welfare loss from being forced to choose another auditor. As a consequence, the net welfare change for clients in UK would be negative and decrease by 7.2 million GBP on average over the sample period.

We would like to point out that although the evidences suggest dramatic changes, we would interpret these counterfactuals with caution. Nevertheless, these estimates are informative about the trade-offs of changing the auditor choice of clients and the cost v.s. benefits of changing audit market structure. For the future research, we are considering several extensions to further the discussions. For instance, we include modeling of strategic price responses from auditors in the policy simulation and the comparison of audit fee changes.

3.8 Appendix

The table for the variable definitions

Table 3.8: Variable definition

Industry	Fama-French 12 industry classification
Industry leader	equal 1 if the audit firm has the highest asset market share in each industry, otherwise 0
Industry specialist	equal 1 if the audit firm has a fee market share over 30% in each industry, otherwise 0
Tenure	equal 1 if the public listed firm is a client of the audit firm in the last year, otherwise 0 in the UK equal 0 if the public listed firm is not a client of any audit firms in the pair in the last year in France equal 1 if the public listed firm is a client of one of the pair of two audit firms in the last year in France equal 2 if the public listed firm is a client of both of the two audit firms in the last year in France
Size	the natural logarithm of total assets
No of industrial segments	includes number of business segments and number of geographical segments
Leverage ratio	the ratio of short plus long term debt to total assets
Current ratio	the ratio of current assets to current liabilities
Quick ratio	the ratio of cash and receivable to current liabilities
Receivables	the ratio of receivables to total assets
Foreign sales	the ratio of foreign sales to total assets
Growth in sales	the ratio of sales in current year to sales in previous year
Price to book ratio	the ratio of market value of a firm to its book value
ROA	return to total assets
Loss dummy	equal 1 if profit is negative, otherwise 0
Cross list dummy	equal 1 if firm is crosslisted in US, otherwise 0
Location dummy	equal 1 if firm's headquarter is located in Paris or London, otherwise 0

Descriptive statistics for industry classifications

Table (3.9) illustrates the descriptive statistics of Fama-French industry specifications for both the UK and France. The distributions of some industries are quite similar for both markets, for instance business equipment, sales, chemicals, utilities and healthcare. Regarding the percentages, for instance in the UK there are more energy related firms and in France there are more consumer related firms. Such differences would be most likely captured by the industry fixed effects included in the audit fee predictions (see Table (3.1)).

Table 3.9: Descriptive statistics for industry classification (Fama French)

	UK		**France**	
Industry	**Freq.**	**Percent**	**Freq.**	**Percent**
Consumer NonDurables	507	6.96%	316	13.08%
Consumer Durables	154	2.11%	124	5.13%
Manufacturing	637	8.75%	278	11.51%
Enrgy	559	7.68%	38	1.57%
Chemicals	168	2.31%	56	2.32%
Business Equipment	1278	17.55%	476	19.70%
Telecommunications	175	2.40%	114	4.72%
Utilities	113	1.55%	30	1.24%
Sales	789	10.83%	244	10.10%
Healthcare	414	5.68%	128	5.30%
Other	2489	34.18%	612	25.33%
Total	7283	100%	2416	100%

Chapter 4

Client Mergers, Audit fee pricing and Audit opinion

4.1 Introduction

In this chapter, I empirically investigate how client mergers and acquisitions (M&A) affect audit fee pricing and auditors' behavior to issue audit opinion in the UK market. This chapter is an extension on one of issues that we addressed in Chapter 3. In the early chapter, we utilize the ratio between the total merged client assets and total client assets in an industry to present the scale of client M&A activities. It means that the higher the ratio, the more M&A activities incurred in a particular industry. And here I provide some further evidence on how client M&A can be viewed as an external shock to the dynamic of auditor- client relationship and how auditors react to such shock. Mergers and acquisitions between client firms present an interesting dynamic for the audit firms. In general, after the merger and acquisition transaction finish, one of the two firms has to drop its auditor. And typically

the auditors of target firms are the ones losing their business (Anderson et al., 1993). The observation from the data confirms the similar trend during the sample period. In my data, 48 firms were target firms in M&A transactions and only 9 of firms kept their original auditors. On the other hand, out of 140 acquirers, 120 firms kept their original choices. So such change creates a shock to the previous stable auditor client relationship. In this case, the target firms more or less involuntarily change their auditors. Hence the sudden available auditors are able to provide their available ability to current clients or compete for new clients. Comparing to voluntary auditor change, auditor change caused by mergers is less likely to represent firm specific incentives since the level of M&A activities in an industry are more likely associated with industry wide shocks, for example deregulation (Becker et al., 2008). So this paper intends to test how would auditors compete in industries with more M&A activities.

Client mergers in fact represent a significant proportion of auditor switch. As indicated by the Oxera report (2006)[1], the most significant reason to trigger switching is client mergers in the UK market. Over 20% of all auditor switches were the results of client mergers. The switching rate in the UK market has been quite low, which was around 4% in the period of 1994-2004 (The Oxera report, 2006) and around 10% in my sample period. But audit switching might have important implications for the level of competition in the audit market. So client mergers should be considered as an important change to the audit market as a whole. In addition, other switches often are triggered by concerns on audit quality or unstable working relationship between auditor and clients (Krishnan, 1994 and Chan et al., 2006). The switch

[1] The report is commissioned by the Department of Trade and Industry and the Financial Reporting Council in the UK

triggered by client mergers seems like more peaceful "break up". The survey results in the Oxera report show that both auditors and clients can well rationalize such change. Since the research on auditor switching typically does not differentiate the different types of switch and more focus on voluntary switch, it should be worthwhile to investigate client mergers separately.

As mentioned earlier, the client M&A activities as a whole in each industry can be seen as an indicator for the condition of that industry. There are also some evidence suggesting that M&A activities might be also associated with certain macroeconomic condition. Matthews (2013) suggests that the recent M&A booms in UK and US market may be because of uprising economic conditions, especially the strength of the stock market. Since mergers are often financed through stocks, firms now have more resources to make acquisitions. And another reason is that central banks such as the Federal Reserve have been keeping interest rates low to stimulate the economy. Since client mergers would change auditor-client relationship, the industry or economic conditions represented by M&A activities might have impact on audit market. The research in this chapter would be the first step to identify possible effects.

In general, the research is mainly twofold: first I look into how client mergers affect audit fee pricing, especially for the client firms which weren't involved in M&A at all; second I examine how client mergers affect auditors to issue qualified opinion. In the last chapter, we show that client mergers have a negative effect on the audit fees. However, we only use the level of client mergers as an instrument variable for predicting audit fees and the validation test was conducted on the whole sample (see Table (3.1)). So in this chapter, I further test the effect of client mergers on audit fees and distinguish client firms which involved in M&A and client firms which

weren't involved in M&A. There are evidences that suggest firms which involve in M&A transaction might face a higher fee because more complex tasks are required by mergers and auditors have to spend more efforts on financial due diligence reviews (Golubov et al., 2011). Moreover, in the first part, I also test whether such negative effect would be perceived earlier by auditors and the persistence of such effect. In the second part, I focus on how auditors would behave by issuing qualified audit opinion after experiencing more M&A activities. So here I consider changes in the propensity of the auditor to issue a qualified audit opinion as a direct outcome of the audit process and possible changes of auditors' behavior (Carcello and Li, 2013). Qualified audit opinions are also considered as audit quality by some research (for instance, Chen et al, 2010 and Firth et al, 2012).

With respect to the tests on audit fee pricing, it is confirmed that audit firms charge less audit fees after more clients merge and acquisition transactions happened. The results also show that the negative effect on audit fee pricing is even stronger for clients which were not involved in M&A activities. And such negative effect would appear even before actual M&A transactions happened. This is possible because many of these M&A deals were rumored around or even announced relatively earlier than the actual transaction took place. So it can be seen as some evidence that auditors perceive the change of certain industry and react accordingly. In contrast, the test on the persistence of such effect shows that the negative pricing effect brought by M&A activities would not appear in the next period, which is defined as the subsequent year. So as certain shock, the level of total M&A activities would only affect the supply of audit market for one period. Next, the results on audit opinion show that auditors are more likely to issue qualified opinions after experiencing more M&A shocks. It means that auditors may behave differently after there were more

M&A activities in certain industry. In addition, such effects are more pronounced in the post 2008 period.

The remainder of the chapter is organized as follows. First, section 4.2 discusses briefly about the related literature. Next, section 4.3 presents the research design. Then section 4.4 shows the test results. The last section concludes.

4.2 Literature review

4.2.1 Auditors and M&A

The research on the relation between auditor and M&A activity is somewhat limited. It is possible that the role of auditors in M&A transactions are less important compared to investment banks or transaction attorneys (Dhaliwal et al., 2013). Nevertheless, prior research has focus on how auditors would influence merger and acquisition outcome (Louis, 2005; Niemi et al., 2013 and Dhaliwal et al., 2013). In general, some of these research compare the M&A outcomes of different auditors, such as the Big 4 and the non-Big 4. For instance, Louis (2005) shows that stock market reacts positively to acquirers with small auditors and it may be because small auditors can provide greater involvement. Dhaliwal et al. (2013) find that target firms and acquirer firms with the same auditors are more likely to make a M&A deal. These research focus on the subset of firms that involve with M&A activity and are interested in the acquisition outcomes. Instead, in this research I focus on the outcome of audit market and look into the effect of M&A activity on a boarder set of firm.

4.2.2 Auditor switch

There have been various studies that address the issues related to auditor switch. These studies are mainly about what trigger auditor switch, how stock market reacts to auditor switch and how auditors react to switch. For example, firms become more likely to switch auditors when firms receive going concern opinions (Krishnan, 1994). Since Big N auditors is considered to have better audit quality, research also show that firms tend to switch to Big N auditors for better audit quality (Cassell et al., 2012). And the evidence on market reaction to auditor switch is more or less in line with this argument. So market reacts negatively if firms switch from Big N and non-Big N auditors (DeFond and Lennox, 2011). Schwartz and Soo (1996) show that auditor switches are associated with reduced audit efficiency, as evidenced by increased reporting lags and earnings announcement delays. With respect to how auditors react to auditor changes, the studies mainly show the low balling effect (for example: Gul et al., 2009) and the opinion shopping (for example: Chan et al., 2006), which mean that at the initial few years of the engagement auditors may be willing to charge less audit fees and clients may seek successor auditors who are willing to issue a clean audit opinion.

However these studies mostly only focus on the firms that changed auditors. So what differentiate this paper is to demonstrate that auditor switch might also have effects on other client firms in the same industry. In addition, some studies also show there might be reputation effect related to auditor switch (Johnson and Lys, 1990; Francis et al., 2013). It means that auditors who lost clients might also experience reputation loss. But such reputation loss is less likely for M&A, because auditors of target firms usually replaced, for instance, Anderson et al. (1993) find a switch in

73% and Firth (1999) finds 85%. This paper contributes this strand of literature by relating the effect of particular auditor switches to audit market as a whole.

4.2.3 Other literature

Gaver and Gaver (1995) propose an interesting theoretical framework that includes both supply shifter and demand shifter in an audit market competition setting. But they also point out that supply shifters are more difficult to observe. As proposed by Gerakos and Syverson (2013), the scale of M&A activities can be considered as some sort of supply shifter because possible available auditors would have more capacity to provide to the market. Here I further test how such shifter would affect audit fees and audit opinions.

Auditor mergers have been used for natural experiment to test the competition of audit firms. Previous literatures focus on investigating the consequences of mergers between audit firms and try to figure out the impact on audit fees, audit quality and so on (Pong, 1999; McMeeking, 2007; Ding and Jia, 2012). However, the mergers between big auditors have been scarce. In UK market, there have been only two significant mergers in the past fifteen years (Currently BDO and PKF are finalizing their merger deal), Price Waterhouse merged with Coopers & Lybrand in 1998 and Deloitte acquired Arthur Andersen after the Enron scandal. If we consider the collapse of Arthur Andersen as a rather extraordinary case, the last ordinary merger between audit firms in UK happened a decade ago. In contrast, client mergers are much more frequent and dynamically changing the audit market. So in this chapter I propose client mergers as another exogenous shock to test how audit firms compete, particularly in the UK market.

4.3 Research design

In this section, I present the regression models for testing and also briefly discuss the data used for this chapter.

4.3.1 Audit fee pricing

In this part I mainly test how client mergers affect audit fees. The literature on audit fee pricing has been discussed in Chapter 3. So I will more focus on the issues related to these tests. To be more precise, the scale of client mergers is evaluated by scaling the M&A assets to the total industry size, with industries based on three-digit SIC codes. It means that when the scale of client mergers is higher, there are more M&A activities within respective industries. Following the argument from earlier section, after M&A transaction incurred between clients, the supply structure of audit firms would be different because one of firms in M&A transaction has to drop its original auditor. In the next period, the dropped auditor may lower its audit fees to compete for new clients to compensate the earlier loss. Another similar argument would be that the dropped auditor may have more available capacity after the M&A and the total supply of audit service shift upwards which leads to lower fees in general (Gaver and Gaver, 1995; Copley et al.,1995). Moreover, the discussion could be also related to the argument for low balling effect. Auditors might use lower audit fees in order to win the client (e.g. Craswell and Francis, 1999; Gul et al., 2009). And the current empirical evidence is limited to initial year engagements. Since in one of main tests all the firms are the ones who do not change auditors, if auditors might lower audit fees, they are actually trying to win over potential clients or simply are trying to stabilize their current client portfolio.

So the basic hypothesis is as follows:

H1: firms in an industry that had more M&A activities would pay less audit fees in the subsequent period.

The regression model is similar to the standard audit fee regression (Hay et al., 2006). The basic model is illustrated as:

$$ln(p_{ijt}) = \beta_0 + \beta_1 MA_{it-1} + \sum_r \beta_r control_{rit} + \mu_{ijt} \tag{4.1}$$

$ln(p_{ijt})$ equals to the natural logarithm of audit fees at year t with respect to client i and auditor j.

MA_{it-1} represents the level of M&A activities by scaling the M&A assets to the total industry size (SIC 3 digit). And this ratio is calculated at year $t-1$.

Control variables include typical audit fee determinants, for instance: total assets, leverage ratio, current ratio, location, receivables and ROA.[2] βs are the coefficients.

4.3.2 Audit opinion model

In the second part of tests, I intend to identify whether auditors would issue audit opinion differently after certain industry experienced more M&A activities. In the UK, a qualified audit opinion contains either scope limitations or non-pervasive departures from GAAP. However qualified audit opinions for publicly-traded companies are extremely rare in the US (Defond et al., 2012). According to the opinion shopping argument, if clients prefer successor auditors who are more likely to issue an unqualified audit opinion, the dropped auditors may want to show their clients

[2] See the details about control variables in the result table and the Appendix.

that they are willing to do so and issue more unqualified audit opinions. Early evidence suggest that clients changed auditors after receiving a going concern opinion but did not get better opinion from the successor (Krishnan, 1994). Then later UK and Chinese evidence suggest that clients would have more qualified opinions if they didn't change auditors (Lennox, 2000 and Chan et al., 2006). But the scenario with M&A activities is somewhat different. First, the switch is not because of getting a going concern opinion. Second, the switch is not voluntary. So it might be different for the effect of M&A on audit opinion. As mentioned in the introduction, M&A activities can represent industry-wide or market-wide conditions. Becker et al. (2008) demonstrate that deregulation in certain industry encourage more M&A activities. So auditors would simply react to the M&A activities by evaluating the related industry shock and incorporate such evaluation into their audit opinion process.

Since the direction of the effect is unclear so I will form the hypothesis as:

H2a: auditors are more likely to issue qualified opinions to firms in the industry that had more M&A activities.

H2b: auditors are less likely to issue qualified opinions to firms in the industry that had more M&A activities.

Here I also focus on the client firms who are not involved with M&A transaction, because firms with M&A might be systematically different from the other firms, for instance, target firms might be in a vulnerable situation or acquirer firms might have more capital to spend (Dhaliwal et al., 2013).

Then the regression model is a logistic model based on the prior research which studies the propensity of qualified audit opinions (Chen et al, 2010 and Firth et al, 2012). The basic model is illustrated as:

$$opinion_{ijt} = \lambda_0 + \lambda_1 MA_{it-1} + \sum_r \lambda_r control_{rit} + \epsilon_{ijt} \quad (4.2)$$

$opinion_{ijt}$ is the dummy variable for qualified opinion, equal to 1 if qualified opinion is issued, 0 otherwise.

MA_{it-1} represents the level of M&A activities by scaling the M&A assets to the total industry size (SIC 3 digit). And this ratio is calculated at year $t-1$.

Control variables include total asset, typical risk and complexity factors (leverage ratio, sale growth, Numbers of segments, loss indicator, litigation risk) and other attributes like tenure and busy season. These are comparable to previous research (Carcello and Li, 2013). λs are the coefficients.

4.3.3 Data

The sample in this study consists of the listed firms in the UK with available data, which is a similar dataset from Chapter 3. The sample period is from 2005 to 2012. The data are mainly from commercial databases. The data on client attributes and auditor-client matches are from Amadeus database. Audit fees and audit opinion data are from Datastream. And the mergers and acquisitions data are obtained from SDC database.

In addition, Table (4.1) presents the summary of descriptive statistics for all the variables. And in this table, the descriptive statistics of the dummy variables are presented slightly different. For instance, it shows that out of 8508 observations, 459 of them received qualified audit opinion.

Table 4.1: Summary table for descriptive statistics

Variable	**mean**	**sd**	**min**	**max**
log(audit fee)	5.046	1.617	-2.714	13.150
MA ratio (MA_{it-1})	1.322%	0.087	0	98.10%
log(total assets)	10.886	2.429	1.792	19.206
leverage ratio	22.293	14.2319	0	986.67
No. of geographical segments	1.702	1.654	0	9
No. of business segments	1.613	1.012	1	9
current ratio	3.492	14.502	0	843.64
Price to book ratio	2.485	31.418	-138.7	168.25
Growth of sales	4.007	15.114	-1.660	113.22
Receivables	0.169	0.653	0	51.439
ROA	-1.149	16.682	-99.68	92.55
Variable	**mean**	**sd**	**obs (dummy=1)**	**obs (dummy=0)**
opinion dummy ($opinion_{ijt}$)	0.054	0.226	459	8049
loss dummy	0.406	0.491	3451	5041
london	0.343	0.474	2922	5586
busy season	0.475	0.499	4048	4460
cross list dummy	4.356	2.499	752	7756
litigation dummy	0.138	0.345	1176	7332

4.4 Results

4.4.1 Results on audit fees

First I test the basic fee regression which show how the level of M&A activities would affect audit fees, then I test whether such effect would be perceived by auditors before the actual transaction. Last, I also test the persistence of such effect.

Table (4.2) shows all the results in a comparison format. So the results of the basic regression are shown in the column where Ln(Audit Fees) is at time t. The coefficient of MA_{it-1} is significantly negative. It means that when more M&A activities happened at time $t-1$, client firm in these industries will pay less audit fees in the next year. So this confirms the hypothesis *H1*. And because the sample is limited to firms who are not involved with any M&A activities, this result also support that MA_{it-1} as supply shifter would have negative pricing effect on the whole audit market.

Table 4.2: Effects of M&A as a supply shock on audit fee pricing

Ln(Audit Fees)	t+1	t	t-1	t-2	t-3
MA_{it-1}	-0.0034	-0.213***	-0.0120**	-0.0158**	-0.0034
	(0.0036)	(0.0593)	(0.0049)	(0.0069)	(0.0075)
log(total assets)	0.5232***	0.5124***	0.5229***	0.5225***	0.5250***
	(0.0215)	(0.0196)	(0.0198)	(0.0215)	(0.0206)
leverage ratio	0.0004***	0.0005***	0.0010***	0.0011**	0.0009**
	(0.0000)	(0.0001)	(0.0002)	(0.0004)	(0.0003)
growth of sales	0.0002***	0.0001***	0.0001***	0.0001***	0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
segment(geo)	0.0897***	0.1061***	0.1118***	0.1173***	0.1250***
	(0.0097)	(0.0083)	(0.0092)	(0.0087)	(0.0075)
segment(prod)	0.0837***	0.0949***	0.0825***	0.0911***	0.0969***
	(0.0139)	(0.0119)	(0.0160)	(0.0129)	(0.0109)
current ratio	-0.0037**	-0.0049*	-0.0042**	-0.0036**	-0.0042**
	(0.0014)	(0.0023)	(0.0017)	(0.0013)	(0.0017)
price to book value	0.0011	0.0001	0.0003	0.0003	-0.0009
	(0.0007)	(0.0004)	(0.0005)	(0.0005)	(0.0010)
tenure	0.0987**	-0.0150	0.0016	-0.0112	0.0161
	(0.0318)	(0.0133)	(0.0167)	(0.0246)	(0.0172)
cross listed	0.2965***	0.2584***	0.2502***	0.2184**	0.2025*
	(0.0589)	(0.0544)	(0.0577)	(0.0747)	(0.0958)
litigation	-0.0626	-0.0849	-0.0415	-0.0288	-0.0393
	(0.0655)	(0.0645)	(0.0506)	(0.0613)	(0.0683)
receivable	0.8488***	0.0585***	0.0590*	0.0526**	0.0394***
	(0.1107)	(0.0180)	(0.0276)	(0.0217)	(0.0051)
ROA	-0.0024***	-0.0026***	-0.0027***	-0.0033***	-0.0039***
	(0.0004)	(0.0006)	(0.0006)	(0.0009)	(0.0008)
loss dummy	0.1111**	0.0603	0.0627	0.0316	-0.0044
	(0.0465)	(0.0459)	(0.0456)	(0.0579)	(0.0650)
London	0.1626***	0.1211***	0.1294***	0.1353***	0.1086**
	(0.0288)	(0.0269)	(0.0281)	(0.0291)	(0.0354)
busy season	0.0823***	0.1044***	0.1064***	0.1193***	0.1077***
	(0.0194)	(0.0218)	(0.0239)	(0.0252)	(0.0246)
constant	-1.3790***	-0.7556***	-1.2660***	-1.2459***	-0.8184***
Auditor fixed effect	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes	Yes	Yes
Observations	5418	7532	5275	4043	3184
Adjusted R^2	0.8377	0.8293	0.8444	0.8465	0.8463

Standard errors are clustered at industry level.

***, ** and * denote significance at the 1%, 5% and 10%, respectively.

Then the columns with $t-1$, $t-2$ and $t-3$ demonstrate how audit fee pricing change before the actual transaction. Since MA_{it-1} is our interested variable, the coefficients in these three columns show that the negative price effect kicks in at the same year as the transaction year and even one year prior to the transaction year. It is possible because these M&A activities are often rumored months prior to the transactions take place and firms often make announcement prior to the actual transaction (Niemi et al., 2013). So auditors might perceive ongoing or possible M&A activities as change of auditor-client relationship. They might adjust audit fees to adapt to possible changes.

Lastly the results in the column $t+1$ show whether such negative price effect would persist after one period. Basically the coefficient is negative but not significant at all, which means the negative price effect caused by supply shifter MA_{it-1} is short term. But since client mergers are rather frequent, such negative price effect would continue on, for example, only the shock from last year would affect audit fees in this year. The signs of control variables are very similar to previous research (Hay et al., 2006) and the results from Chapter 3. In addition, I control for auditor fixed effect, year fixed effect and industry fixed effect in order to make sure that the results are rather robust. And I also winsorize the data at the 1% and 99% percentile and run the same tests. The results remain similar and the effect remain robust.

4.4.2 Results on audit opinion

Here I mainly present and discuss the results on how client mergers affect auditors to issue qualified opinions. So Table (4.3) demonstrates the results from the logistic regression on the propensity of qualified audit opinion. The same as be-

fore, the MA_{it-1} is the most interested variable. Interestingly, the coefficients are all positively significant, which means that auditors are more likely to issue qualified opinions to firms in the industry that had more M&A activities. So *H2a* is true. When facing the change of auditor supply structure, auditors are willing to be stricter on issuing qualified opinions. It seems that they do not want to comfort current clients or attract potential clients by issuing a clear opinion. And if we consider the argument that auditors use supply shock to evaluate industry condition, the results show that auditors in fact consider firms in industry with higher MA_{it-1} as more problematic. If we only consider the post-2008 period, the effect on the propensity of qualified audit opinion gets even stronger. It is possible that this stronger effect is driven by the fact that the financial crisis made many firms vulnerable and become possible M&A targets (Dhaliwal et al., 2013). However, further research on what drive these M&A activities is needed to identify the actual incentive of auditors.

There are also some interesting results on the control variables. For instance, firm with larger size, higher profit and higher liquidity is less likely to receive a qualified opinion. And firm with more geographical segments is more likely to receive a qualified opinion. The auditor tenure has no effect on the propensity of qualified audit opinion, which suggests auditors are not getting cozy with their clients.

Table 4.3: Effects of M&A as a supply shock on audit opinion

Auditor opinion dummy	Full sample	Post-2008
MA_{it-1}	0.1625**	0.2548***
	(0.0890)	(0.0643)
log(total assets)	-0.2549***	-0.2618***
	(0.0559)	(0.0728)
leverage ratio	0.0001	0.0001
	(0.0002)	(0.0001)
segment(geo)	0.0987***	0.0549
	(0.0276)	(0.0468)
segment(prod)	-0.1655	-0.1656
	(0.1504)	(0.1662)
current ratio	-0.0208**	-0.0586***
	(0.0097)	(0.0209)
price to book ratio	-0.0006	0.0001
	(0.0014)	(0.0019)
growth of sales	-0.0081	-0.1027***
	(0.0106)	(0.0254)
cross listed	-0.7795**	-0.7704*
	(0.3271)	(0.3996)
receivable	-0.9533***	-0.7939***
	(0.2777)	(0.2697)
ROA	-0.0153***	0.0395
	(0.0040)	(0.0261)
loss dummy	0.9754***	1.0913***
	(0.0687)	(0.1130)
London	0.0824	0.1226
	(0.1142)	(0.1229)
busy season	-0.2657	-0.5169*
	(0.2884)	(0.2638)
litigation	0.4416	0.3141
	(0.3212)	(0.4412)
tenure	0.0095	0.0185
	(0.1041)	(0.1859)
constant	-2.1082***	-0.3932
	(0.3790)	(0.7258)
Auditor fixed effect	Yes	Yes
Year effect	Yes	Yes
Industry fixed effect	Yes	Yes
Observations	7534	3275
Pseudo R^2	0.2035	0.1729

Standard errors are clustered at industry level.

***, ** and * denote significance at the 1%, 5% and 10%, respectively.

4.5 Conclusion

In this chapter, I investigate how client mergers affect audit fee pricing and auditors' behavior to issue qualified audit opinions. M&A activities between client firms create some kind of shock to audit market because the auditor-client relationship is affected. Some auditors, mostly likely auditors from target firms become available. This paper considers such shock as supply shifter and provides evidence on how auditors would react to the supply shifter. From a price competition perspective, the paper shows that in general audit firms charge less audit fees after more M&A transactions happened, and client firms which are not involved in any M&A transactions receive lower audit fees in the subsequent period. And such fee reducing effect would appear even before the actual merger transaction took place. Given the fact that some of these transactions were rumored or announced relatively long time before the transaction date, it is possible that the auditors anticipate and react to possible competition pressure. However, the negative pricing effect is not persistent and only valid for the next year. After experiencing more M&A activities in certain industry, auditors are more likely to issue qualified opinion for the clients in the same industry. Such effects are more pronounced in the post 2008 period.

This paper is an extension to Chapter 3 but a further step on a less explored setting. And future research are expected to understand more about how the level of M&A changes the competitive strategy of auditors.

4.6 Appendix

Table 4.4: Variable definition

Industry	Fama-French 12 industry classification
Tenure	equal 1 if the public listed firm is a client of the audit firm in the last year, otherwise 0 in the UK
Size	the natural logarithm of total assets
No of industrial segments	includes number of business segments and number of geographical segments
Leverage ratio	the ratio of short plus long term debt to total assets
Current ratio	the ratio of current assets to current liabilities
Quick ratio	the ratio of cash and receivable to current liabilities
Receivables	the ratio of receivables to total assets
Foreign sales	the ratio of foreign sales to total assets
Growth of sales	the ratio of sales in current year to sales in previous year
Price to book ratio	the ratio of market value of a firm to its book value
ROA	return to total assets
Loss dummy	equal 1 if profit is negative, otherwise 0
Cross list dummy	equal 1 if firm is cross-listed in US, otherwise 0
Busy season	equal 1 if fiscal year ends in December, otherwise 0
London	equal 1 if firm's headquarter is located in London, otherwise 0
$opinion_{ijt}$	equal 1 if firm i receive a qualified opinion from auditor j at year t, otherwise 0
MA_{it-1}	the ratio of the M&A assets to the total industry size (SIC 3 digit) at year $t-1$

Chapter 5

The Impact of Accounting Regulatory Change on Banks: A Study on the Reclassification of Financial Assets*

5.1 Introduction

After the mandatory adoption of IFRS in the EU as of 2005, accounting scholars and practitioners began more serious debates about fair value accounting versus historical cost accounting (e.g. Beatty, 2007; Muller et al., 2008). In general, regulators such as FASB and IASB favor the use of fair value accounting in financial reporting, especially regarding the financial reporting of financial instruments. However, the credit market turmoil in 2008 has led the management of many financial

* This chapter is a spin-off paper based on my master thesis (co-authored with Maliza Matovu).

institutions to wonder what exactly the accounting numbers stand for.[1] Although both the FASB and IASB strongly disagree with the idea of changing the fair value regime, both regulator bodies face serious demands from some politicians and industry entities (Jones, 2011). On the 13th of October 2008, the IASB amended to IAS 39 which permits the reclassification of certain financial instruments from fair value accounting practice to historical accounting, and IFRS 7 requires additional disclosures in respect of reclassification practice. These amendments were issued to address the prevailing market conditions that many banks were reporting huge write-downs, and were therefore issued fairly rapidly. Since the new amendment to IAS 39 gives the IFRS followers permission to reclassify certain financial assets, it partially changes the mark-to-market requirements and such regulatory changes certainly impose impact on accounting practice and disclosure, especially for financial institutions. As it was controversial and not entirely in line with what IASB planned for (Jones, 2011), it is interesting to study the subsequent consequences of the new regulatory adjustment, to see how bank entities from different regions are affected, and how relevant information was disclosed.

The recent financial crisis forces the accounting system to evaluate the fair value approach on a worldwide scale, and this makes the study of fair value accounting more contemporary (Barth and Landsman, 2010). The purposes of our paper are to provide some direct empirical evidence on the impact of practicing reclassification of financial instruments and shed some light on the use of fair value accounting on financial instrument when the accounting policies have been switched from fair value accounting to historical accounting. Among the first ones (Bischof et al., 2011 and Fiechter, 2011) to study this significant regulatory change empirically, this paper

[1] Deloitte 2008 web report

examines and analyzes the impacts brought by the reclassification of financial assets, and how the reclassifications are associated with the different bank characteristics. Moreover, this paper provides evidence indicating how the reclassification activities have affected the accounting results and financial disclosures. This paper also shows that banks from different European regions reacted differently to such regulation change and experienced different accounting results and disclosure. The general findings show that under inactive market situations, the new amendments help banks with the problematic financial assets by avoiding further impairment losses. The banks that applied the option were characterized by a lower ROE and bigger bank size and banks from more developed regions were more likely to adopt such option. And the sampled banks that implement such option were not all fully complied with the disclosure requirements of the amendment to IFRS 7 and in general the banks from more developed regions performed better to meet the disclosure requirements.

The paper is organized as follows: Section 5.2 presents the regulation background and literature review. Section 5.3 provides the research strategy and data collection. Section 5.4 describes the findings and empirical results. Section 5.5 concludes.

5.2 Regulation Background and Literature Review

5.2.1 Regulation Background

When given the requests from politicians and industry participants to address the new market developments (Hughes et al. 2008; Moyer, 2008), the IASB recognized the need to clarify IFRS as a response to the credit crisis. They wanted to make

sure that the European financial institutions were not deprived of the opportunity to compete with their international competitors, in terms of accounting rules and their interpretation. To create a "level playing field" with US GAAP, as far as the ability to reclassify financial assets was concerned, IASB monitored developments in the United States to avoid inconsistencies under both accounting standards (KPMG 2008 report, page 2). Noticeably, similar reclassifications were permitted by SFAS 115 and SFAS 65 under US GAAP, before the IASB introduced its amendments. The changes to IAS 39 and IFRS 7 approved by the EU on 15th October 2008 allow reclassifications of certain financial instruments under "held for trading" to either "held to maturity", "loans and receivables" or "available for sale". Also the amendment to IAS 39 permits transfer of certain financial assets from the category of "available for sale" to "loans and receivables". In general, the amendments were introduced to enable bank entities to record instruments which are no longer traded in an active market at amortized costs instead of mark-to-market values. We expect to see less volatility and some emerging issues such as the comparability of accounting practice after the amendment has been applied. The earliest date for reclassification of the relevant financial assets was 1st of July 2008, and all of the assets were measured at their fair value on the date of reclassification.

According to the amendments, the regulatory changes do not concern the classification and measurement of derivatives. It is non-derivative financial assets that are majorly involved with the reclassification rules. There are a total of six different reclassification forms. Figure (5.1) shows: the first four (in green) are newly permitted by IAS 39 and the other two (in red) are already permitted by the previous standard. Two of the conditions that must be met when financial assets are transferred out of "available for sale" and "held for trading" into "loans and receiv-

ables" (that is, measured at amortized cost) are that the definition of loans and receivables at initial recognition is met by the relevant financial assets and that the entities have the intention and ability to hold the financial assets for the foreseeable future or until maturity. Before or after the reclassification, financial assets cannot be reclassified into fair value through profit or loss after initial recognition. So the requirement of no reverse treatments remains the same.

Figure 5.1: An illustration of the six reclassification forms

To make transparent to financial report users, the amendment to IFRS 7 brings more extensive disclosures requirements. Hence the amendment standards state that an entity should disclose specific information if it applies these amendments. This disclosure information includes initially the amounts reclassified in and out of each category along with the relevant reasons. Secondly, an entity has to disclose: "for each period following the reclassification, including the period in which the financial asset was reclassified, until derecognition of the financial asset, the fair value gain or loss that would have been recognized in profit or loss or other comprehensive income if the financial asset had not been reclassified, and the gain, loss, income and expense recognized in profit or loss" (IASB, 2008). Thirdly, the financial reports must include the effective interest rate and estimated amounts of cash flows the entity expects to

recover, on the date of reclassification of the financial asset.

5.2.2 Literature Review

First of all, this paper is related to the discussion on the use of fair value accounting, especially for bank entities. The theoretical discussions developed by Freixas and Tsomocos (2004) or Plantin et al. (2008) address the role played by fair value accounting in the stability of financial markets and pointed out the possible downward effect of using the fair value accounting for banks in the event of financial stress. Recently, after the crisis progressed, there are studies (Barth and Lansman, 2010; Laux and Leuz, 2010) that examine the influence of fair value accounting on the crisis in the US setting. They conclude that the fair value accounting approach should not be blamed for the crisis. The evaluation of fair value accounting is also related with relevance and reliability. The relevance discussed by most of the prior research tries to determine whether fair value disclosures in the banking industry have incremental information content and explanatory power over and above historical cost (Barth et al., 1996; Eccher and Healy, 1996 and Khurana et al., 2003 etc.). Benston (2006) and Penman (2007) point out that fair value based on related information or professional judgments are costly to determine and verify. Furthermore, the use of fair values could be readily manipulated by opportunistic and over-optimistic managers (Ramanna, 2008). This study adds to the discussion by examining the impact of transferring financial assets from fair value accounting to historical accounting practice.

Secondly, the literature regarding the determinants and consequences of accounting choice offers evidences about how managers make decisions to affect firm per-

formance, or make choices for communication purposes (Holthausen and Leftwich 1983; Watts and Zimmerman 1986; Holthausen, 1990; Fields et al., 2001). Barlev et al. (2007) show that the motives and effects related to asset revaluations vary across different countries. With respect to the study on particular reclassification options, Gramlich et al. (2006) show that firms manage accounting ratios through the reclassification option which from short-term obligations into long-term debt. Considering the reclassification of financial assets particularly, this accounting choice offers certain costs (ex. costs to collect and disclose relevant information) and benefits (ex. possible avoidance of future losses). So as a rather sudden change on the accounting practice, the reclassification choice could be heavily influenced by banks' financial position and performances. Our study contributes to this stream of literature by offering evidence on what kind of banks applied this option and how their accounting results were affected.

Thirdly, this paper is also related to the research on the factors affecting decisions by managers on financial reporting and disclosures (Ahmed and Courtis, 1999; Healy and Palepu, 2001 etc.). There have been studies that associate different firm characteristics with accounting disclosure. For instance, Hossain et al. (1994) test the firm-specific characteristics such as firm size, total assets, leverage level, auditor type and find a significant correlation between voluntary disclosure with firm size and leverage. However, the results about the company-specific characteristics are not always consistent and tend to vary depending on whether it is about the general disclosure level or more specific types of information (Chavent et al, 2006). Because financial service firms have been routinely excluded from prior research, we know less about how banks form their disclosures. So our study adds to the literature by providing evidence that how banks' disclosure respond to the amendment guid-

ance, especially during the crisis in which much attention focused on their financial condition and profitability.

Lastly, this study contributes to the research on the comparison of certain accounting practice in different regions. The application of international accounting regulation intends to improve the consistency of accounting treatments. However, when disclosure practice from various countries are considered, there is a concern that the convergence of accounting standards may not lead to the convergence of accounting practices if firms do not comply with the standards (Street et al., 1999; Street and Bryant, 2000; Street and Gray, 2002). The problem is partially caused by the fact that the newly developing countries do not have enough qualified accounting professionals (Eccher and Healy, 1996) or the familiarity and language accessibility to international accounting standards affect the level of compliance (Abd-Elsalam and Weetman, 2003). Tsakumis, Doupnik, and Seese (2006) presented evidence to explain the diversity in geographic area disclosure practices. So this paper also evaluates whether inconsistent practices or disclosures emerge from the different sampling regions.

5.3 Research design and data collection

5.3.1 Research design

Descriptive analysis

The direct changes on the valuation, such as changed incomes or equity figures, are all revealed when the new accounting treatments are applied. And the comparison is conducted on the different categories of financial assets that were involved with

these reclassifications. The disclosures regarding the information of reclassification are evaluated using a self-constructed checklist. The selection was based on the required six items. In this checklist, every item that a bank had was denoted "1", as in fulfilled, and for items that they did not have "0", as in not fulfilled. This is similar to Cooke (1989), who adopted the use of dichotomous procedure in which an item scores one if it was disclosed and zero if it was not disclosed. And the approach of disclosure checking list is consistent with the previous disclosure literature (Meek et al., 1995, Eng et al., 2003). Figure (5.2) illustrates the basics of how the checking list works [2].

Figure 5.2: Disclosure checklist

Item checklist:

Item A: The amount reclassified into and out of each category;
Item B: The carrying amounts and fair values of all financial assets reclassified in the current or previous reporting;
Item C: Financial asset that has been reclassified based on the "rare circumstances";
Item D: Fair value gain or loss recognized in profit or loss or in equity (other comprehensive income) for that reporting period and in the previous period;
Item E: The gains or losses that would have been recognized in profit or loss or equity had they not been reclassified, together with the gains, losses, income and expenses now recognized;
Item F: The effective interest rate and estimated cash flows the entity expects to recover the date of the reclassification of the financial asset
Extra disclosure: Other additional disclosure associated with reclassification

Disclosure score checklist in accordance with new paragraph 7.12A

Bank	Region	Item A	Item B	Item C	Item D	Item E	Item F	Extra disclosure
Ex Standard Chartered	Western	1	1	1	1	1	1	1
	Total:							

Hypothesis developments

Frist of all, with regard to the reclassification choice, it is suspected that non-financial and financial characteristics of sampled banks might have significant influence on their decision whether to adopt this option or not.

[2] In regards to item F, in IFRS 7:12A, it states information regarding both "effective interest rate" and "expected cash flow". So if only one of them were covered in the disclosure, then "0.5" will be assigned to this item.

The new amendments do not allow any financial asset that has been reclassified out of “fair value to profit or loss” category to be reclassified back into the category in the future. Consequently, if the financial asset should be carried at amortized cost after reclassification, future increases in fair value will not be reflected in the balance sheet immediately. So the relevant assets that banks are interested in are the ones they anticipate to have downward fair value in the future. It is possible that the banks operating European-wide are more likely to expose their assets portfolio to the market turbulence in the time of financial crisis. So these banks might have higher demand to avoid further losses if they could reevaluate their problematic financial assets. Some studies (Boyd et al. 1993; Gunther and Robinson, 1999 etc.) suggest that banks can benefits from the geographical diversification. Berger and DeYong et al. (2001) indicate that banks operating in multiple regions can diverse their operation risk in order to control the scale of default losses. However, the empirical evidences on the scope of economic effects through cross-border expansions of financial companies are still unclear, especially in the European context (Allen et al. 2011). Given the magnitude of this crisis, it is very likely that the multinational banks are unable to mitigate their operation risk or possible losses of certain regions through diversifications, because most of the regions are affected (KPMG, 2008). Besides geographic expansion, banks can also increase its market power by diversifying the business activities, for instance, conducting more non-lending activities. Kroszner and Rajan (1994) point out commercial banks diversify their activities into investment banking because it is more profitable. But these banks also have to deal with the conflicts of interest coming from the coexistence of investment and commercial banking activities within the same company (Uhede et al., 2009). In the setting of financial crisis, the investment banking businesses were heavily affected

(Moyer, 2008), and since most of the financial assets from this part of business are recorded under the fair value accounting, it is possible that banks under more stress from investment banking want to take advantage of this option. Then the following hypothesis can be derived:

H1a: Banks operating EU-wide are more likely to adopt the reclassification option.

H1b: Banks operating with more investment-banking business are more likely to adopt this option.

Regarding the financial characteristics, similar to previous studies that evaluate the performance of banks or financial institutions, for instance Kosmidou et al. (2006) and Carbo et al. (2007), the financial ratios are indicators of the competitive position and financial status of a bank. By evaluating the firm's performance, these ratios demonstrate the banks' strengths and weaknesses from different perspectives. This is also consistent with the idea of reclassifying financial assets that reconstruct the firms' financial position and performance.

First of all, the earlier studies on the relation of bank size and bank performance provide mixed evidence. For example, Calomiris (2000) finds an inverse relationship between bank size and bank failure in the US. But Hughes and Mester (1998) suggest that consolidation between banks tends to increase the risk of bank portfolios. The argument of "too big to fail" protection also challenges these debates in the recent crisis. It is obvious that the banking associations in Europe were lobbying for the change to IAS 39 and the role of the big banks in this discussion is also evident (EBA, 2008). And as the aim of the regulators is to mitigate the competitive difference between European banks and US banks, the major market players may be most likely to take advantage of this option and become more comparable to

their US counterparts. Moreover, the analysis report issued by Deloitte (2008) suggests that when considering the reclassification option, whether other entities in the industry will reclassify similar financial assets or not should be considered. Then the bigger banks have certain information advantage and they are likely to strategize the accounting choices in a more similar way.

H2a: Banks with larger size are more likely to reclassify the financial assets.

Secondly, according to the guidance reports issued by audit firms (Ernst & Young, 2008 and Deloitte, 2008), whether reclassification will result in any benefit to the entity is quite crucial for the decision to adopt the option. In practice the benefits are often considered in terms of "profit or losses" and equity changes. For example, for those financial assets that will be classified as "available for sale", exchange differences will continue to be recognized in the income statement, and if the instruments were to decrease in value, all amounts recognized in equity will be reversed out of equity and into profit and loss. The profitability and cost efficiency ratios are possible to be associated with the reclassification option. So we predict that the banks adopted the reclassification option are likely to be characterized with lower ROE. The predication on leverage ratio is rather unclear, as the effect on the leverage stress by the reclassification is not straightforward, although it could impose equity change on the banks.

So the following hypothesis is derived:

H2b: Banks with lower ROE are more likely to reclassify the financial assets.

Thirdly, earlier studies (Moyer 1990; DeAngelo et al. 1994) suggest that banks under the pressure of capital requirement use certain accounting choice to manipulate the capital adequacy ratio for instance the estimation of loan loss provision. After the introduction of Basel II, the industry regulators are more stringent about

the adequate capital requirements. The reclassification of financial assets would affect the banks' capital structure. So it is possible to expect that the banks might opportunistically use the reclassification option to adjust the capital ratio to meet the regulatory requirement and avoid regulatory costs.

Then the logit regression model is illustrated when the dependent variable is to describe the reclassification choice made by different banks, whereas the independent variables include the selected financial ratios and non-financial characteristics.

$$R = \beta_0 + \beta_1 OT + \beta_2 OR + \beta_3 RG + \beta_4 TA + \beta_5 LER + \beta_6 CAR + \beta_7 LLP/TA + \beta_8 ROE + \varepsilon. \tag{5.1}$$

Where: R is the dependent variable for the event of reclassification ($R = 1$ for the banks applied the reclassification option and $R = 0$ for the banks that did not apply the option). OT represents business type for our bank samples. The banks identified are involved with either general financial services or a multi business including investment banking, insurance and asset investments. OR is another scale factor which denotes whether the bank entities are operating regional or European-wide (European-wide also include banks that are operating globally). RG stands for the regions which are Eastern Europe, Southern Europe, Northern Europe and Western Europe. TA represents business sizes, and the values here are the total assets of bank entities. LER and CAR stands for leverage ratio (Debt to equity ratio) and capital adequacy ratio. LLP/TA is loan loss provision scaled by total assets. ROE is return on equity.

The hypothesis regarding the disclosure on the new reclassification and bank characteristics are developed as follows: regarding the non-financial characteristics,

there are evidences that firms operating more diversely or from more developed regions tend to perform better on the disclosure evaluation, especially on the voluntary disclosure. As suggested by Cuijper and Buijink (2005), companies operating more internationally tend to have higher disclosure level. Meek et al. (1995) and Mangena et al. (2007) found evidences that firms from countries with more sophisticated financial markets voluntarily disclose more accounting information. So it is possible that the sampled banks from western and northern Europe perform better on the disclosure of reclassification activities than the sampled banks from eastern and southern Europe.

H3a: Banks operating European-wide have a higher disclosure level on the reclassification activities.

H3b: Banks operating in more developed region have a higher disclosure level.

Regarding the financial characteristics, some of previous studies (Cooke, 1991; Wallace et al. 1994; Ali et al. 2004 etc.) showed that the size of company has a positive association with its disclosure level. It seems that larger bank entities are likely to make more voluntary disclosure since they have more professionals and lower cost to collect relevant information, as well as greater demand from external user (Ahmed and Courtis, 1999). When firms' leverage level are high, firms may have to disclose more information because creditors might require more information to control their risks. It is possible that companies with higher profitability may disclose good news to attract potential investors and reassure current investors (Meek et al. 1995; Lopes and Rodrigues, 2008). But They also have to stick to the disclosure level when things turn worse. So the case of profitability ratio is not clear. For instance, banks with better profitability could be more willing to share more information with the report users; however, banks with better profit ratio might not

need to reclassify their assets. And if the investors consider the reclassification as a sign of having many problematic assets, then banks might be reluctant to disclose more information.

H3c: Banks with bigger size have a higher disclosure level.

H3d: Banks with higher leverage level have a higher disclosure level.

The model (includes all the mentioned variables) can be illustrated as follows:

$$DiscS = \lambda_0 + \lambda_1 OT + \lambda_2 OR + \lambda_3 RG + \lambda_4 TA + \lambda_5 LER + \lambda_6 CAR + \lambda_7 LLP/TA + \lambda_8 ROE + \epsilon. \tag{5.2}$$

Where: $DiscS$ is the dependent variable for the level of disclosure with regards to reclassification and it indicates the disclosure score from the disclosure checking list. Besides the variables of interests the rest of indicators are used for control variables. OT represents business type for our bank samples. The banks identified are involved with either general financial services or a multi business including investment banking, insurance and asset investments. OR is another scale factor which denotes whether the bank entities are operating regional or European-wide (European-wide also include banks that are operating globally). RG stands for the regions which are Eastern Europe, Southern Europe, Northern Europe and Western Europe. TA represents business sizes, and the values here are the total assets of bank entities. LER and CAR stands for leverage ratio (Debt to equity ratio) and capital adequacy ratio. LLP/TA is loan loss provision scaled by total assets. ROE is return on equity.

5.3.2 Data Collection

Banks that were of interest for this paper were entities that had a sufficient amount of disclosed information, had geographical diversity, and were following IAS/IFRS. Similarities between the countries were categorized to one of the four regions: Northern, Western, Eastern and Southern. Some bank policy literatures (Sinkey et al., 2000; DeYoung et al., 2004; Carbo et al., 2007) target banks from one certain region where the political or financial systems have similarities. According to Mikko (1996), the Nordic countries have similarities in their political systems and their well-developed welfare system. Western Europe is characterized for its well-developed banking environment whereas Eastern Europe for not having a sophisticated banking system. Eastern European financial market was neglected for quite long period of time (Fink et al., 1998) and still has troubles as new state members to integrate with to other EU economies (Mitra et al., 2009). Countries in Southern Europe are included in the group code law and are characterized by an association between financial and tax accounting (Shleifer and Vishny, 1997). Furthermore, the region of where the bank entities had their main operation was considered. The primary base of the sample size is the bank list of the Euro Banking Association (EBA), which consists of 189 European banks. Due to data availability and other issues for instance the sampled banks need to have information regarding the reclassification, the banks need to follow IFRS and some banks' annual reports were in their native language, the final sample size was 53 banks (See the Appendix for the breakdowns), and had about 13 banks from each regional group. The accounting results and the financial disclosures were obtained manually from the banks' 2008 annual reports or taken from their consolidated group financial accounts. Most of the data are

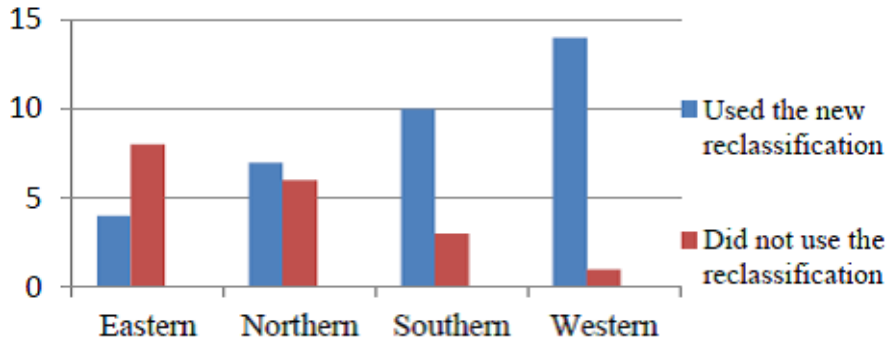
obtained from specific notes on reclassification in the annual reports.

5.4 Empirical finding and results

5.4.1 Descriptive findings

We had 53 banks in our sample, the entities that had applied the reclassification amendment were 35 banks, and the remaining 18 banks did not choose the option to reclassify. The research showed that the usage of the new reclassification amendment was high in Western and Southern region. This is beneficial for entities that operate on a market-wide scale as their financial assets portfolio will be subjected to various financial risks. In regards to the bank entities in Northern and in particular Eastern region, the application of the reclassification was low. They had been exposed to a relatively small profit change, and an explanation could be that their financial assets portfolios were less exposed to the inactive market.

Figure 5.3: Usage of the reclassification option

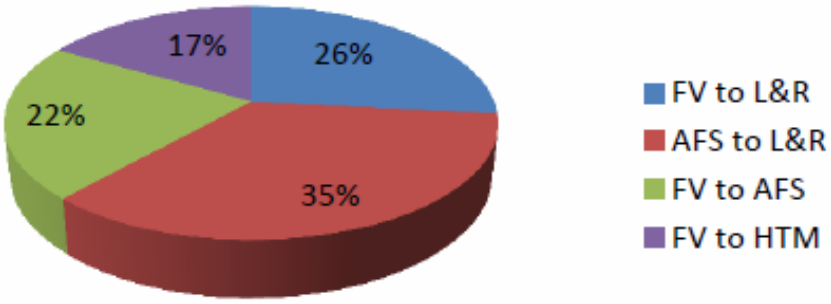


Banks operating European-wide all applied the reclassifcation option, and around 58% of regional banks applied. With regards to "operation type", 71% of the banks with multiple business used the reclassification option, while 68% of the banks with

general business applied. It seems that the different operational types (e.g. general business and multi business) have less influence on the choice of reclassifying financial assets.

As stated in the new amendment, the non-derivative financial assets under held for trading (fair value) can be reclassified into available for sale or held to maturity when exposed to rare circumstances. As shown in Figure (5.4), 22% of the sample size had reclassified its financial assets under "held for trading" to "available for sale", whereas 17 percent had reclassified its financial assets from "held for trading" to "held to maturity". The banks which transferred their financial assets out of "available for sale" into "loans and receivables" were34% and 27% had reclassified from "held for trading" to "loans and receivables". The two last reclassification forms could be achieved when available for sale and held for trading met the definition of loans and receivables.

Figure 5.4: An overview of the four reclassification forms



Beside the categories transfers and the changes on accounting treatments (e.g. relevant valuation approaches from fair value to amortized cost), the most significant adjustments on the results of 2008 brought by the reclassification actions are avoided profit losses or fair value losses, and the changes on revaluation reserves, which

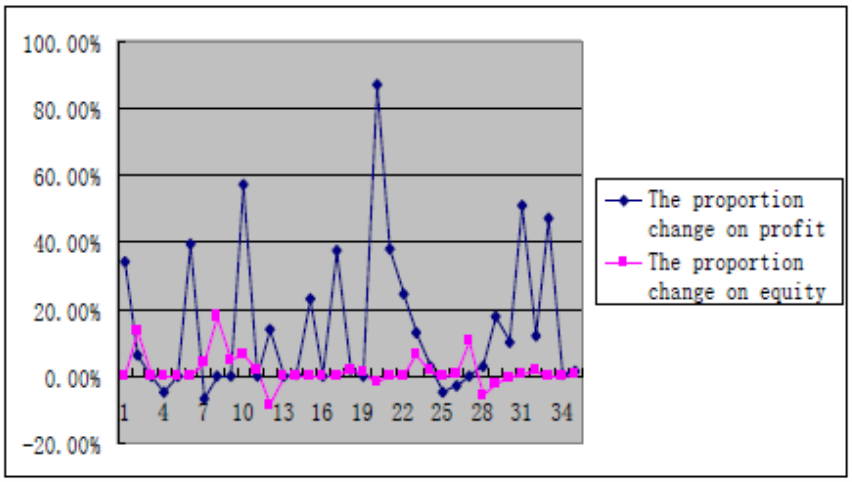
directly contribute to shareholder equity. When the financial assets under held for trading are transferred, the avoided value losses affect the profits of entities directly, and if the assets from available for sale are also involved, the shareholder's equity will receive either a positive or negative impact, mainly positive. The banks in the sample that had applied the new amendment, 27 of them had their profits affected and 23 banks had equity changes due to the reclassification.

Then the percentage change on the profit or equity resulted from the reclassification are calculated (under the assumption that no tax effects and all the valuation losses go into profit or equity account). The proportion changes made on the profits due to the new reclassification were significant, and the previous differences with regards to avoided valuation losses become less significant among different groups. 15 banks avoided fair value losses, more than 10% of their current profits, and in these 15 banks there were 3 banks over 50%, whereas 5 banks falling into the 30% to 50% range. The size and region of banks did not undermine the effect of reclassification on the profits. In Eastern group, the sample banks are small players with less profit; however, one of the banks reduced losses by 34 percent of its current profit.

In the following figure, it clearly shows that the reclassification had more influential impacts on entities' profit results than shareholder equity since the values of "profit change" are moving further away from the x-axis than the values of "equity change".

As mentioned in the previous sections, the positive effects on equity will be compromised by valuation losses when the financial assets were reclassified into available for sale. Since the strategy is to reclassify the assets that exposed to problematic market, stabilizing the operation results and avoiding further losses are the main purposes of reclassification. Many bank entities seem to enjoy the

Figure 5.5: The comparison of percentage changes on profit and equity



obvious change on profit result. The fair value changes through profit account play an important part of operating results. On the other hand, the unrealized fair value gains or losses take up relatively small percentage of shareholder equity. Moreover, the revaluation reserves, under the category of supplementary capital in most circumstances, do not reflect ordinary business results. The effects on equity are also limited because revaluation reserves usually are not able to be used by the entities for leverage purposes. Nevertheless, the positive effects on revaluation reserves help the banks with their capital status.

5.4.2 Empirical results

Descriptive statistics

Overall, all banks from Western region and all bank entities operating European-wide applied the new amendment. The following section regarding the descriptive statistics will focus on the financial variables and their differences between the sample groups that applied the amendment and the group that did not apply the

amendment.

Table 5.1: Summary table for descriptive statistics of financial variable

	mean	**min**	**max**	**sd**
Sample group that applied the new amendment (N=35)				
D/E ratio	29.775	6.000	131.000	25.11
ROE	−5.61%	−216%	−25.9%	0.43
Capital ratio	11.70%	4.48%	17.70%	0.03
LLP to TA	0.50%	0.00%	1.80%	0.00
Log TA	5.159	2.335	6.343	0.918
Sample group that did not apply the new amendment (N=18)				
D/E ratio	16.713	7.000	29.100	7.60
ROE	12.34%	0.67%	24.40%	0.08
Capital ratio	12.24%	9.81%	22.30%	0.03
LLP to TA	0.65%	−0.03%	2.52%	0.01
Log TA	4.356	2.499	5.735	0.97

As shown in Table (5.1), the sample group which applied the new amendment had a high D/E ratio that was higher than the average, as well as a large amount of total assets that was higher than the sample banks that did not apply the amendment. With regards to the ROE ratio, it was clear that the second sample group showed a stronger profitability as it was higher than the average. As Mann-Whitney U test shown in the Appendix, there were certain differences on the variables such as D/E, ROE and Log TA (logarithmic form of total assets) for the two sample groups. We saw no difference on the other two financial ratios: capital ratio and LLP to TA.

Logit regression results

Noticeably, in the whole sample group the Log TA has a relatively high association with D/E ratio which indicates that larger banks tend to apply more aggressive leverage policy. In regards to a financial turmoil as the current situation, this could

cause some serious liquidity issues that would be reflected as losses in the financial reports. Moreover, these two variables are applied in different variable sets.

So in order to obtain the relationship of the non-financial variables and the dependent variable, as well as the differences between the two sample groups, the Chi-square tests were also performed (see the Appendix). The results of the Chi-square tests illustrate that there are certain differences in the frequency of region (significant at the 0.01 level) and the operation region (significant at the 0.05 level) across the two groups, however not with the operation type. Based on the results of the Chi-square tests, the bank entities from more developed regions, Western and Northern and banks operating EU-wide were more likely to reclassify their financial assets. The operation type does not affect the reclassification event, which means that the banks involved with high-risk business are not necessarily in favor of applying the option to reclassify their financial assets. Because the logit regression results are not significant, the hypothesis H (1a) is partially confirmed. And there is no evidence to support the prediction of H (1b), and it is possible that the dummy variable of "operation type" does not capture the difference of banking business type.

According to the results in the table (5.2), the ROE ratio was significant in model 1, and all the coefficients of ROE were also negative. Thus, it indicated that the banks that did not apply the option were characterized by a higher ROE compared to the banks that had applied the reclassification. So the reclassification prevents further valuation losses and this helps with the profitability performance of bank entities. The future practice of this amendment might be an incentive for the management to avoid poor profit performance, and could potentially be a problem. The variable Log TA is found significant to model 1 and 2 with a positive

Table 5.2: The logistic regression results

R	Model1	Model2
Region		-17.264
		(0.301)
OR		-17.038
		(0.998)
OT		-2.109 **
		(0.070)
D/E ratio	0.043	0.025
	(0.321)	(0.383)
ROE	-6.911*	-3.891
	(0.100)	(0.510)
Capital ratio	21.975	42.850
	(0.184)	(0.201)
LLP to TA	32.930	-7.445
	(0.636)	(0.926)
Log TA	1.172 **	1.273*
	(0.026)	(0.044)
Prediction percentage	74%	84%
Pseudo R^2	0.1363	0.2466

Notes: ***, ** and * denote significance at the 1%, 5% and 10%.

R is the dummy variable for the event of reclassification. Region stands for the dummy for developed regions. OR is a dummy factor which denotes whether the bank entities are operating regional (as 0) or European-wide (as 1). OT represents business type for our bank samples: denote as 0 when traditional financial services; denote as 1 when include investment banking and insurance. LogTA represents the logarithmic form of total assets. LLP to TA is Loan Loss Provisions/Total Assets. ROE is return on equity. Model 1 includes only the financial variables; Model 2 includes all variables.

coefficient. It was a contrast to ROE, as the banks that had applied the amendment had exhibited a larger bank size. An argument that could be made is that the larger banks prefer to apply the reclassification option, as the banks with larger monetary size are more likely to have more problematic financial assets that need to be dealt with. Then these findings support the prediction of both hypothesis H (2a) and H (2b).

The variable D/E ratio did not exhibit any significant results in the table above. In a nutshell, the D/E ratio is not really relevant. Indeed, the reclassification of certain financial assets may help entities with their leverage by preventing valuation losses through equity. But the effects on shareholder equity are somehow limited as seen in the Figure (5.5).

The results regarding capital ratio and LLP to TA are insignificant, when paying attention to the model results and individual test. The two variables contributed less in the regression model, and had the least relevance over the dependent variable. This also matched the results from Mann-Whitney U test. So the hypothesis H2c is not confirmed. The reasons that the capital ratio did not differ from the two groups, and was less affected by the reclassification could be that the Basel II regulation around that time allowed bank entities to raise more obligatory capital which would increase the capital ratio. Subsequently the effects brought by the new amendment might possibly be hidden. The effects could be possibly insignificant, for example two sample banks had even disclosed information that the application of reclassification did not affect their capital adequacy ratio. Secondly, LLP to TA is not significantly different between the two groups. Although a large amount of financial assets were reclassified into loans and receivables, the entities intend to hold these assets for certain time period and the default possibility would not rise

as the assets were just reclassified. However, the future situation might be a lot different when the default possibility increases. A higher loan loss provision might occur in the entities that reclassified a large amount of its financial assets to loans.

Evaluation on the disclosure of reclassification

In this section, the results on the disclosure evaluation are demonstrated and followed by the regression results. As shown in table (5.3), the average score of 35 banks was 6.12. As the average score was little over 6, which was the score after meeting all six required items[3], however there are 15 out of 35 banks were not fully complied with the disclosure requirements set out by IFRS 7.12A. Some banks made additional efforts to disclose more relevant information. From the extra items they disclosed, we can see that the banks with higher disclosure score tried to reveal more details about the reclassification and the reclassified assets, which gives the various user groups a better idea about how the reclassification actions were affecting the entities. The transfers of financial assets out of fair accounting valuation to amortized cost were mostly belong to the level 2 or 3 of the fair accounting hierarchy. However, only 10 sample banks clearly stated the detailed information regarding what valuation the assets were applied with before the reclassification.

From the regional groups, we could see that Western group had a higher average disclosure score on information of the reclassification. The average point of Northern group is slightly higher than the total average score. The average disclosure scores

[3] The extra information mentioned in this part are the same as the extra items used in the completed evaluation table. They are: 1. The break-down information about reclassification in different business segment; 2. The break-down information about reclassification on different financial products, for instance, US market portfolios; 3. The effects of reclassification on some other issue besides profit/loss, equity, for example, the effects on credit risk or capital ratio; 4. Detailed explanation on why they had reclassified into these particular type of financial assets. This extra type of information covers all the extra items we found in the researched banks annual reports.

Table 5.3: Summary of disclosure scores

Group	Number of banks	Average score	Max score	Min score
Total sample	35	6.12	9	4.5
Northern EU	6	6.5	7	6
Southern EU	10	5.45	7	5
Eastern EU	4	5	5.5	4.5
Western EU	14	6.71	9	5.5
Region-wide	20	5.84	7	4.5
EU-wide	15	6.49	9	6

of Southern and Eastern are all below the average level of the entire sample group. Eastern group performed the worst in all four regional groups. However the results would not establish a solid generality that the banks in this group could not meet the disclosure requirements in the new amendment. Nevertheless, it was evident that the bank samples from Western Europe performed more professionally and disclosed extra information related to reclassification activities in addition to the six basic requirements.

With regards to the group of "European-wide" or "Regional-wide", the average scores of disclosure were quite different: European-wide banks had higher average score of 6.49 and the average of Regional-wide group were lower than the average score. The reason could be that the European-wide banks are more sophisticated with their disclosure techniques and have more professionals to analyze their relevant problems.

For the specific disclosed items, the most problematic item was item F, which requires the disclosure on "effective interest rate" and "expected cash flow" from recovery of financial assets. We believe that many banks did not pay attention to this matter, due to the effective interest rates varying from entity to entity, and are usually applied internally. Secondly, the figures of expected cash flows are more objective than fair value or carrying amount of relevant assets. If the entities

overestimate their figure, it would not have substantial effects on either entities or the report users. Thirdly, some of the expected cash flows on certain assets might be difficult to obtain since there is no active trading market and few reliable inputs can be applied. As a result some entities may follow the approach that miss this information than report it unreliably. One of purposes of the disclosure requirement introduced by the new amendment was to maintain the comparability between the information regarding the reclassification released by the financial reports of different entities. When the entities disclosed the relevant information of effects on profit or equity, it raises the question whether the information of effects on other issues such as risk estimations or financial indicators should become part of the regulatory requirements. And we believe that the extra items some entities disclosed can be taken into consideration or references to develop upon.

Then the results from table (5.4) show the relation of disclosure level and bank characteristic:

From the two sets of regressions with financial variables (Model 1.1 and 1.2), apparently among all the financial indicators, the total asset of bank (Log TA) has the strongest contribution in both regression models. This approves the prediction of H (3c). Then it is followed by the positive contribution from D/E ratio and capital ratio (both at the significant level of 10%.). So these two variables might have certain but not strong relationship with the disclosure score on reclassification. H (3d) is not confirmed. Possible explanation could be in our case the general demands on more information from creditors agreed by many previous studies might be weaken by the fact that financial institutions such as banks usually have higher D/E ratios than other sectors and large proportion of their creditors are individual customers who do not have powerful influence. ROE and LLP to TA both have negative contribution

Table 5.4: The results of regression models (dependent variable: disclosure score)

	Model1.1	Model1.2	Model2
Region			0.188
			(0.961)
OR			0.122
			(0.590)
OT			-0.163
			(-0.842)
D/E ratio	0.245*		0.166
	(1.602)		(1.001)
ROE		-0.200	
	(-1.280)	(0.510)	
Capital ratio	0.249*	0.247*	0.146
	(1.563)	(1.476)	(0.776)
LLP to TA	-0.202	-0.200	-0.162
	(-1.263)	(-1.225)	(-0.913)
Log TA	0.578 ***	0.642***	0.504**
	(3.533)	(3.947)	(2.031)
Obs	35	35	35
Adjusted R^2	0.490	0.473	0.474

Notes: ***, ** and * denote significance at the 1%, 5% and 10%.

The dependent variable is the level of disclosure with regards to reclassification and it indicates the disclosure score from the disclosure checking list. Region stands for the dummy for developed regions. OR is a dummy factor which denotes whether the bank entities are operating regional (as 0) or European-wide (as 1). OT represents business type for our bank samples: denote as 0 when traditional financial services; denote as 1 when include investment banking and insurance. LogTA represents the logarithmic form of total assets. LLP to TA is Loan Loss Provisions/Total Assets. ROE is return on equity. Model 1 includes only the financial variables; Model 2 includes all variables.

and statistical insignificance.

If we compare our results with some previous papers that focus on financial instrument disclosure, the results with entity size are consistent with the previous study of Chalmers and Godfrey (2004). They conclude positive relationship between size and disclosure level. The positive result of operation region is also similar with Cuijpers and Buijink's study, as they found more internationalized companies have better disclosure level. But some other studies did not come across the same conclusion. Our finding of limited positive influence from D/E ratio is not consistent with some previous studies (Abd-Elsalam and Weetman, 2003; Lopes and Rodrigues, 2008).

Robustness check

Several robustness tests were performed to assess whether our basic findings change when other variables are used or added. First of all, region variable represents the similarity of the underlying social and financial system. And one might argue that the differences of law system might also play a role. So we use the variable "Law" (1=code law; 0=common law) in the logit regression but it doesn't show any significance. The reason could be the fact that many European countries are code-law countries. Secondly, we also include the amount of total financial assets the sampled bank has as control for the incentive that banks with more financial assets tend to apply this option. However, this relation is not significant and the explanation could be that it is more decision-relevant when the amount of problematic assets is high not the total amount. Thirdly, we tested whether the reclassified amount of financial assets is associated with the disclosure level. When the reclassified amount is scaled by the total assets, it is not correlated with the disclosure score. And

the profit change caused by the reclassification is also not relevant to the disclosure level, which suggests that the entities affected by the reclassification significantly did not disclose more relevant information than the entities that were less exposed to the new amendment. Lastly, as suggested by the disclosure literature (Becker et al. 1998), the auditor type might affect the voluntary disclosure level. So we include an extra variable "auditor" (1=big four, 0=otherwise) in the disclosure regression and it doesn't affect the results and the variable itself doesn't have significance. This could be that most of sampled banks were audited by the big four and as the amendments are first-time application the auditors were also uncertain about how much information should be included.[4]

5.5 Conclusion

In this study, the first application of the new amendment (to IAS 39 and IFRS 7) provided a great opportunity to learn about the impacts brought by the reclassification of financial assets and how this practice was associated with the different characteristics of bank entities. As the banking industry has changed dramatically and the application of such option requires closer monitoring, the IASB has been making some continuing regulatory modifications (e.g. introduction of IFRS 9). Facing the option to reclassify certain financial assets, banks showed different strategies to deal with the problematic assets. Generally, banks with different characteristics handled the option to apply the new amendment, the practice and the disclosure of the reclassification differently. In our sample group, 35 entities out of the total 53 applied the amendment. From regional perspective, the banks samples from West-

[4] KPMG(2008) report

ern region were more in favor of this option than the entities from Northern and Eastern Europe. After the reclassifications were applied, the profit or shareholder equity of the bank entities could be affected positively by avoiding future valuation losses. In our study, more banks took advantage of the positive effects on profits. The positive effects on shareholder equity are not significant as expected. The reasons could be that the unrealized fair value gains or losses usually take up relatively small percentage of shareholder equity.

The relationships of the reclassification and selected characteristics of bank entities were studied by taking the sample group that did not apply the amendment as a comparison. The results of the logistic regression and other statistical analysis show that the banks that did not apply the option were characterized by a higher ROE compared to the banks that had applied the reclassification. So the banks with lower ROE are more likely to apply the amendment. In contrast to ROE, the bank size exhibited positive prediction sign which means that the larger bank entities prefer to apply the option. It could be explained by the fact that the larger entities possessed more problematic financial assets to deal with. Moreover, the results also show that the D/E ratio was relevant, but not heavily associated. With regards to the non-financial characteristics, region was the most significant factor and the operation type did not affect the decision of entities to apply the reclassification.

The disclosures on the reclassification practice were evaluated by the un-weighted checking list. As the reclassification was applied for the first time, there were some inconsistencies among sample entities, especially the disclosure about the “expected cash flow” and the “extra items”. The regression analysis was performed to examine the relationship between evaluation results on disclosure and bank characteristics. The bank size and region are significantly associated with the disclosure level but

not the operation type.

Indeed, there are some caveats concerning our study, firstly we applied a limited hand-collected sample and the generality of the results are limited. Nevertheless, our sample banks contain more banks from Eastern Europe compared to similar studies. And we believe that our study provides some valuable points and results for future studies. Some of the studies conducted in this paper can be a starting point for some future topics. For instance, based on our studies, the studies on the relationship between reclassification and impairment of financial assets would be a valuable contribution to this particular area. Furthermore, it would be interesting to see how different types of financial assets react to the reclassification; especially the problematic ones (e.g. embedded derivatives). Secondly, the factors related to the reclassification of financial assets we focus on are the banks' geographic, operation characteristics and some relevant financial indicators. The more detailed banking regulation environment and financial market incentives are not included and these might also be the drivers for the managers' decisions.

5.6 Appendix

Table 5.5: Table for the sample country breakdowns

Region	Country	Obs	Appy	Didn't apply
Western Europe	Austria	2	1	1
	Belgium	1	1	0
	France	2	2	0
	Germany	5	4	1
	Netherlands	2	2	0
	United Kingdom	3	3	0
Eastern Europe	Czech Republic	2	0	2
	Hungary	2	1	1
	Latvia	2	2	0
	Lithunia	1	1	0
	Poland	4	0	4
Southern Europe	Greece	5	5	0
	Italy	4	3	1
	Spain	2	1	1
	Portugal	3	2	1
Northern Europe	Denmark	4	3	1
	Finland	2	0	2
	Iceland	1	0	1
	Norway	2	1	1
	Sweden	4	3	1
Total		53	35	18

Table 5.6: Non-parametric tests for financial variables

	D/E ratio**	ROE**	Capital ratio	LLP to TA	Log TA***
Mann-Whitney U	167.500	163.000	240.000	248.000	133.000
Wilcoxon W	287.500	793.000	870.000	878.000	253.000
Z	-2.011	-2.107	-0.476	-0.307	-2.742
Sig. (2-tailed)	0.044	0.035	0.634	0.759	0.006

***, ** and * denote significance at the 1%, 5% and 10%, respectively.

Table 5.7: Chi-square test for non-financial variables

	Region	Operation region	Operation type
Pearson Chi-square	13.297***	8.333**	0.036
	(0.004)	(0.050)	(0.849)

***, ** and * denote significance at the 1%, 5% and 10%, respectively.

Chapter 6

Conclusion

In this dissertation, the four chapters mainly address different issues regarding the impact of regulation in a competitive market and how market participants react strategically in such market. The main findings highlight certain regulation or regulated disclosure would affect market participants differently, often depending on their own attributes and the competitive nature of the market.

In Chapter 2, I investigate the effect of conservative reporting on the output and profits of competing firms in a product market. The results show that if only the existing competition was considered, the incumbent firm would obtain higher output outcome if the rival firm was imposed with a less conservative reporting system. And with respect to the expected profit under duopoly case for each incumbent firm, there exists an optimal level of conservative bias that might maximize the expected profit, but it was subject to the informativeness of the accounting report. The finding also suggest that accounting distortion introduced in such accounting system decreases the expected profits of existing competitors. To avoid anti-trust investigation, such distortion might not be worse off for the incumbent firms. More importantly, firms

may use conservative reporting as a credible commitment device in a product market competition setting.

In Chapter 3, the demand estimation approach was employed to investigate the effect of mandatory joint audit reform on audit market structure in UK. Based on the observations in French market, we measure the firms' perceptions of the services provided by the Big Four, the medium and small auditors, and examine how different firms choose different pairs of auditors. Then given the preferences of individual auditors and pair choices derived from French market, we simulated how listed firms in UK respond to such policy change and the potential evolution of market structure. There are three major findings of the demand estimation approach. Firstly, the public listed firms in both countries have heterogenous preference for the big four auditors. For example, the bigger firms prefer the combination of having two big four auditors as a pair. Secondly, market leader auditor would experience substantial rise in the share of number of clients as well as a fair increase in the share of clients' assets. The second auditor would enjoy a small growth in the both market share measures. And the small auditors would benefit very marginally from the joint audit by expanding their market shares by a very tiny percentage. Thirdly, that joint audit would increase clients' consumer surplus to some extent due to the positive pair effect, but this pair benefit is not high enough compensate the welfare loss from being forced to choose another auditor. This implies that the net welfare effect is somewhat limited.

In Chapter 4, I empirically investigate how client mergers and acquisitions affected the audit fee pricing and the auditors' behavior to issue audit opinion in the UK market. The results showed that audit firms charged less audit fees after more clients merged and acquisition transactions happened. And such fee reducing effect

would appear even before the actual merger transaction took place. In contrast, auditors are more likely to issue qualified opinion for the clients in the industry with more M&A activities.

In Chapter 5, the relationships of the reclassification and selected characteristics of bank entities were studied by taking the sample group that did not apply the amendment as a comparison. The results of the logistic regression and other statistical analysis show that the banks that did not apply the option were characterized by a higher ROE compared to the banks that had applied the reclassification. So the banks with lower ROE were more likely to apply the amendment. In contrast to ROE, the bank size exhibited positive prediction sign which means that the larger bank entities prefer to apply the option.

Every research study has its own limitations, which, however, could be the threads for potential future research. In the following, I will list some limitations and possible future research.

In Chapter 2, there are three improvements could be considered for future research. First, other disclosed information except cost and other influencing factors such as debt contracting could be included in the model to test whether the present results will hold. Second, social welfare analysis could also provide more policy implications. Finally, multiple periods of reporting could be included in the analysis to investigate firms' completive position. In Chapter 3, we could extend the model with strategic price responses from auditors in the policy simulation and the comparison of audit fee changes. The framework we used in Chapter 3 could be applied to other policy issues in the audit market. Chapter 4 is a preliminary step to better understand how auditors react to exogenous changes of auditor-client relationship. And I think it is an interesting setting to further explore how auditors compete with

each other in a rather dynamic fashion. To sum up, I think further research are needed for the role of accounting or regulation in different competition settings and we can also pay more attention to certain market which is both highly regulated and politically oriented.

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Eidesstattliche Erklärung

Hiermit erkläre ich, die vorliegende Dissertation selbständig angefertigt und mich keiner anderen als der in ihr angegebenen Hilfsmittel bedient zu haben. Insbesondere sind sämtliche Zitate aus anderen Quellen als solche gekennzeichnet und mit Quellenangaben versehen.

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